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Materials Handled Economically

Marked Savings Obtained by Studebaker Corporation from Operation
of Transportation Department Employing 200 Men and
Like Number of Equipment Units

BY JOHN R. SULLIVAN*

AT the Studebaker Corporation, production is carried on in a number of separate buildings. Bodies, for example, are made in a five-story factory located at some distance from the assembly building. Body stampings are turned out in another structure, while other parts originate in the foundry, forge shop and power plant departments, each of which occupies its own building. In addition, there are still other buildings that contribute their share toward the manufacture of Studebaker automobiles.

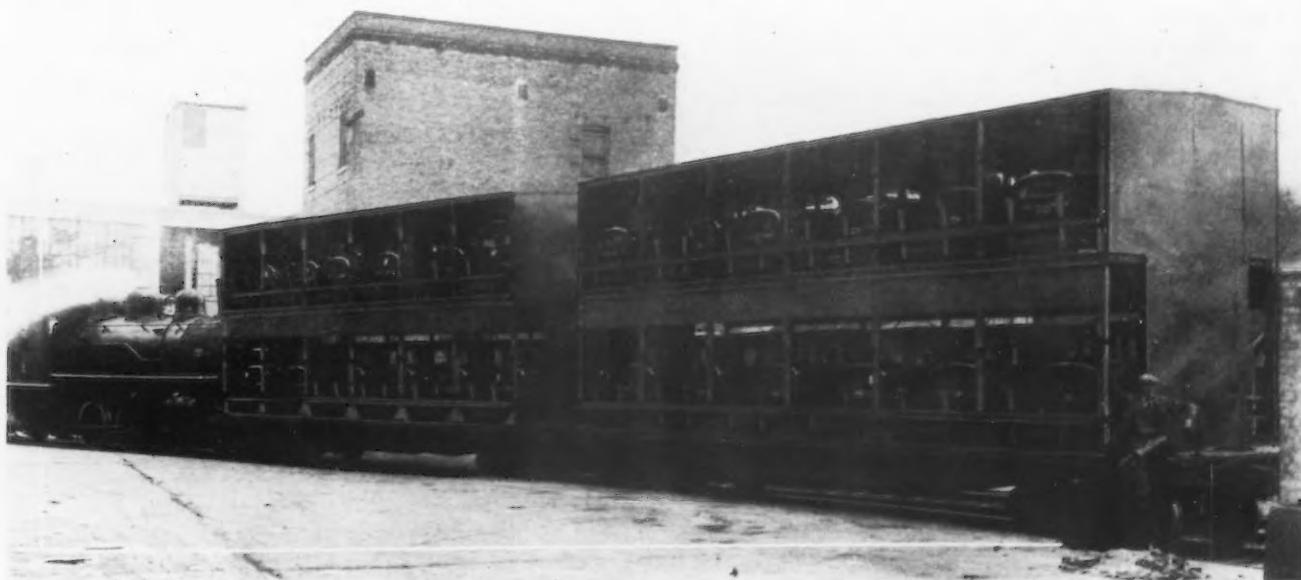
It is little wonder, under the circumstances, that efficient and economical means of transporting materials in and among the many buildings is a major problem. For its solution the company created some years ago a transportation department, the growth of which has paralleled that of the company's production facilities.

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Today the department consists of approximately 200 men and a similar number of equipment units. Among the types of carriers are steam locomotives, Fordson tractors, gasoline trucks, electric trucks, electric-lift trucks, hand-lift trucks, side-dump trucks and various kinds of truck trailers.

The use of hand-lift trucks is minimized. Wherever possible they are in service only for short hauls to deliver material to power trucks, and for moving parts from one floor to another in the same building. Wherever power trucks have been installed, electric trucks are employed for transportation inside buildings, and gasoline trucks and tractors for outside work and for interdepartmental hauls.

An effort is made to move materials between departments on the ground floor or outside buildings so that power equipment can be used. In the body department, for instance, there are several stations to which hand



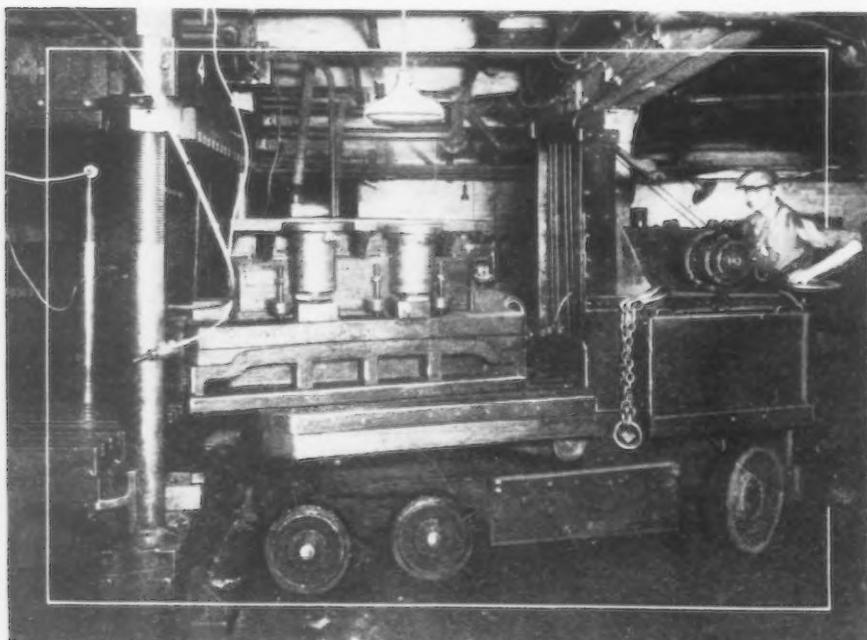
BODIES Are Transported from Body Plant to Assembly Building on Flat-Type Railroad Cars with Specially Constructed Double-Deck "Uprights"

trucks bring material on elevators to the main floor, where it is prepared for haulage by tractors operating on regular schedules.

Trucks Handle Overflow from Conveyors

Delivering parts from the machining, forging, stamping, foundry and spring departments to the assembly lines, the transportation department must coordinate its activities with those of mechanical conveyors, which have recently been installed in numerous departments. Sometimes a conveyor is taxed beyond its capacity, and in such instances the transportation department with trucks and trailers relieves the pressure. To cite a specific case, the final assembly lines might unavoidably be slowed up temporarily and before word could be passed along to sub-assembly departments, parts on conveyors might accumulate so rapidly as to create congestion. Trucks and trailers then are used to take off some of the material and deliver it to its destination.

So far as possible each operator has a routine daily schedule. Generally he traverses his route a number of times during the day, recording the time of arrival at the end of every trip. The department has a central office where all telephone calls pertaining to special



LIFT TRUCKS, CAPABLE OF HANDLING DIES WEIGHING 30,000 LB., ARE USED TO MOUNT DIES ON PRESSES

movements of material are received. The routing man there enters calls on a special chart, turning them over to the operators whose schedules are light at the moment. This is done through working gang bosses, who keep in touch with the office in person or by telephone. When assigned a special job, the operator receives from the routing office a slip giving information about the task. Upon completing the work, he delivers the slip back to the routing clerk, who records the closing of the transaction.

Schedule Based on Number of Cars Produced

The department's daily schedule is based on the number of finished automobiles produced each hour. In the majority of departments supplying assembly lines with parts, deliveries are made every half hour. However, at some points the time is reduced to 15 min. This is necessitated by the fact that there is practically no "bank" or stock of certain parts for the assembly lines, so that deliveries must be made to the assembly building almost as quickly as parts are produced.

Since there is no storage space for finished parts, except a small bank, which soon would disappear unless frequently and regularly replenished, any department which falls much under its scheduled output is likely to tie up production in the entire plant. The same condition would be created if the transportation department failed to meet its responsibilities.

Incoming and outgoing freight cars are handled in the company's yards by the Studebaker industrial railroad, which operates in the same manner as independent carriers and is under the supervision of the Interstate Commerce Commission. It has a personnel of 30 men and owns 12½ miles of track. Four locomotives are in service, each having a crew of five men, including an engineer, fireman, switchman and a conductor. Four railroads—New York Central, Pennsylvania, Wabash and Grand Trunk—have receiving tracks at the entrance to the company's yards and at this point deliver freight cars to the company's railroad system. All incoming and outgoing freight cars are weighed by a weighmaster and are routed by a yardmaster. The railroad handles approximately 9000 carloads of raw materials and finished automobiles each month.

The duty of maintaining its locomotives devolves upon the railroad, and a special crew of three men, two during the day and one at night, is assigned this task. Track maintenance, however, is taken care of by the maintenance department.

SIXTY PER CENT SAVED IN HAULING REFUSE SAND

Marked savings have been made in the cost of hauling refuse cinders and sand from the foundry to a dumping ground outside the city limits of South Bend. A few years ago the department contracted with a hauling company to have this material removed, but installation of its own equipment for this purpose has reduced the expense 60 per cent. Equipment comprises various types of refuse side-dump wagons, ramps, chutes and gasoline tractors. The refuse, which amounts to about 300 cu. yd. daily, is handled by a train consisting of a gasoline tractor and six side-dump wagons.

One of the most important tasks of the department is the transportation of bodies from the body factory to the assembly building. This is accomplished by means of a locomotive and four flat-type railroad cars with specially constructed double-deck "uprights." Each car has a capacity of 12 bodies, six on the lower deck and six on the upper.

BODIES LOWERED TO LOADING DOCK

At the end of the body assembly lines on the sixth floor of the body factory is a "lowerator" elevator, which delivers bodies to the loading dock on either the mezzanine or the main floor, the delivery point depending upon whether bodies are to be loaded on to the upper or lower decks of the railroad cars. Each loading dock is equipped with an electric hoist, which lifts bodies on to trucks. The trucks operate on rails extending from the dock to the door of the railroad cars, on to which bodies are pushed by hand. When a car is filled the gates on the sides of the car are closed and the bodies are automatically locked in position.

When cars reach the assembly building, bodies are unloaded in a manner similar to that in which they were

PARTS Are
Carried From
Manufacturing
Departments to
Assembly Build-
ing on Trailers
Pulled by Gaso-
line Truck



SPECIAL Calls Received by Transportation Department Are Recorded on Sheet Shown Above. Monthly maintenance operating sheet, setting forth all expense items, is kept for each unit in the department

IN Forge Shop
Material Is
Moved from
One Operation
to Next in Steel
Trays Carried by
Electric Lift
Trucks



loaded at the body factory and are taken by elevator to the fourth floor, where they are held temporarily until they go to the assembly line. Through a hole in the floor they are lowered by electric hoist to the chassis on the assembly line on the third floor. Numerous models of cars are assembled at the same time on one chassis line, and therefore it is imperative that bodies be delivered to the chassis line according to the sequence of the model of cars going through at the moment. The lowerator in the body factory and the elevator in the assembly building each have a capacity of 120 bodies an hour, or one every half minute. In handling bodies the transportation department employs 30 men.

Panels, doors and other metal parts produced in the body stamping department are delivered to the assembly department by gasoline tractors and trailers. Within the body stamping department, electric lift trucks and trailers are used. The outstanding pieces of equipment are two Elwell-Parker electric "hi-low" lift trucks capable of handling dies weighing 30,000 lb. These trucks are utilized to mount dies on presses. They make possible a change from one set-up to another in a few minutes as compared with several hours by the former method, the quick change keeping the presses in almost continuous operation and thus cutting down production costs. The labor expense of eight men has been saved in this manner.

Trucks Facilitate Forge Shop Operations

In the forge shop, material in process is moved from one operation to the next in steel trays carried by electric lift trucks. Trays are of various sizes and shapes and are placed at the side of hammers and heat treating furnaces, where they are in the most accessible position. The department is so laid out that material passes through a complete cycle without backtracking and the use of electric lift trucks and trays facilitates the forward movement. During final inspection the material is transferred from trays to trailers to be hauled by a gasoline tractor to the assembly building.

Getting into the foundry, the duties of the transportation department are as well defined as in other departments. The industrial railroad delivers all raw materials in freight cars into the foundry receiving bay. Charges for the cupolas are handled by specially designed conveyors and trucks operating on tracks. Electric trucks and trailers are used extensively in taking castings from the molding floor to the cleaning room and thence, after inspection, to the machine shop. Refuse, such as core and molding sand, passes from the foundry floor down through chutes into trailers stationed in tunnels running underneath the foundry. The trailers are hauled by electric tractors to the crane bay of the foundry, where

refuse material is transferred by crane from the trailers to large chutes, through which it is dumped into refuse wagons outside the building.

For foundry work the transportation department has 20 men and a like number of pieces of equipment. Men are divided into gangs directed by gang bosses. In every case the gang boss drives a piece of equipment, but his duties in this respect are so arranged that he has considerable free time in which to supervise the activities of his men and to coordinate them.



REFUSE from Foundry, Such as Core and Molding Sand, Passes from Foundry Floor Down Through Chutes into Trailers Stationed in Tunnels Running Underneath Foundry. Trailers are hauled by electric tractors to crane bay, where refuse material is transferred by crane to large chutes, through which it is dumped into refuse wagons outside building

able at all times. The department carries its own stores division. Every part or piece of equipment is requisitioned out of stores and is charged against the individual unit for which it is intended. Incidentally, each unit has a number for identification purposes.

For each unit a monthly maintenance operating sheet is carried, and on it is recorded the driver's wages, repair men's wages and the cost of all supplies, such as gasoline, oil, charging of batteries and repair parts. At the end of every month the actual operating expenses for the previous 30 days are calculated so that the department knows exactly what each unit in service is costing. For large expenses, such as the purchase of tires, the amount is not charged against a single month, but is pro-rated over a period of several months.

Germany Takes Half the World's Tungsten

China dominates the world tungsten market due to the possession of huge deposits permitting surface mining with cheap labor. Of the 8000 metric tons of ore (basis 60 per cent WO₃) produced in the Orient, 5200 net tons was imported by Germany. According to Colin G. Fink, *Metal Industry*, 1928, this is almost half the world's output. A great many deposits are known in the United States, but only a few are producing; the total marketed in 1928 was 1290 net tons of 60 per cent WO₃ concentrate, valued at \$761,000. The largest producer is the Nevada-Massachusetts Co. at Mill City, Nev., where the output is expanding.

Assembling an Airplane Engine

Process Is Done Twice, with Intermediate Close Inspection
—Frame Used to Hold Crankcase

BY FAY LEONE FAUROTE*



IT is interesting to watch the assembly of a Wright Whirlwind engine. In the first place, all of the parts, which have been manufactured in the various bays, after traveling in the logical order from one machine to another as the process progresses, finally, after numerous tests and inspections, are carefully wrapped or placed in sub-divided trays to protect them from harm in transit, and taken from the stockroom. A group of finished parts required, withdrawn from here as needed, begins the small assembly.

The crankcase is set on a frame—a special assembling device mounted on wheels and capable of being rolled along a track from one assembly station to another. After putting up the crankcase, the smaller parts are added to it. The crankshaft with its bearings next goes in; then the master rod. The link rods with the pistons attached are fitted to the master rod and the whole mounted on the crankshaft.

The intermediate section of the crankcase, carrying

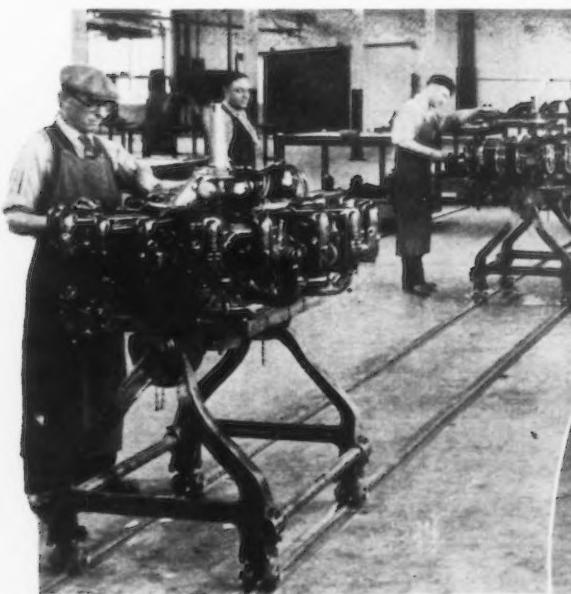
the valve tappets, is then added. The camshaft, the cam driving gear, go in next. Finally, the cylinders with the valve rockers, valves and springs are bolted to the crankcase. The push-rod housing, the push rods, intake manifold, magnetos and spark plugs are next added.

After wiring, the engine is timed, the magnetos synchronized, the carburetor and the manifold assembly and the rear section of the crankcase attached; the rocker-box covers screwed on. The engine is then ready for test.

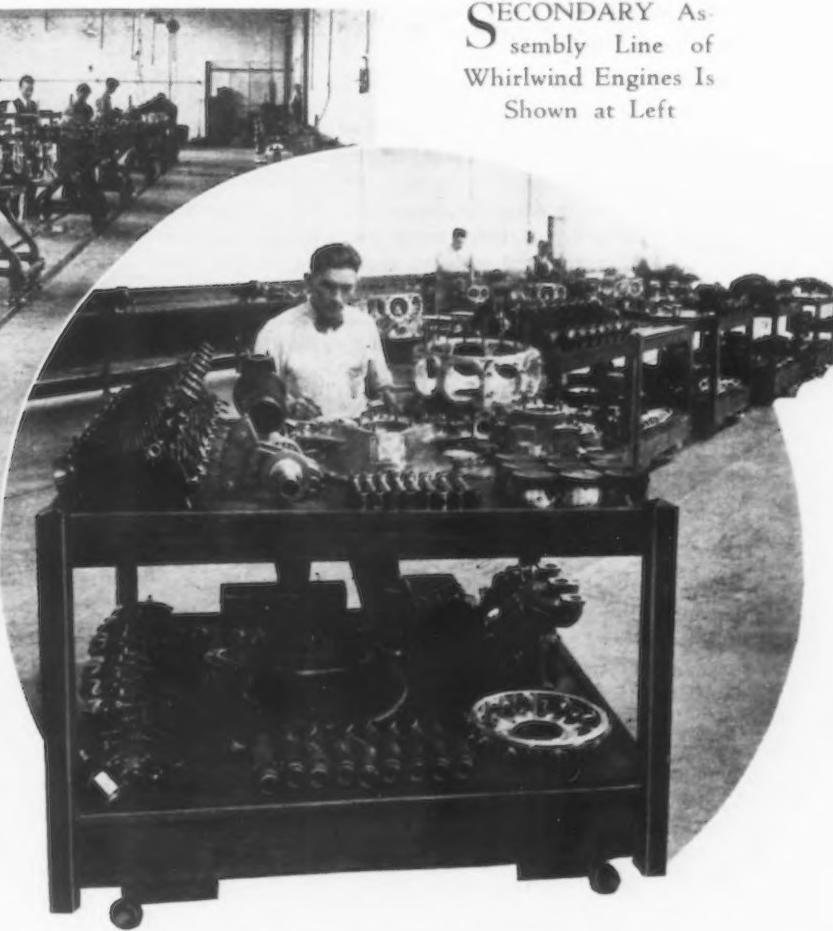
It is given a run of 5 hr., driving a four-bladed propeller (see test chart). If it measures up to established standards, it is then disassembled, thoroughly washed, minutely inspected and examined for flaws, then taken back to the assembly line and carefully reassembled for delivery to the purchaser. After being weighed, dry, it is then greased and oiled, taken to the final testing room and run for 2 hr., where a final record of its performance must meet the same standards. Then it is retouched and is coated with slushing oil for protection, numbered, registered and crated for delivery.

Nowhere along the line is close vigilance slackened. There is always ever present the knowledge that here is a piece of mechanism upon which a man's life may depend.

*Mechanical engineer, New York. In THE IRON AGE of July 18, page 148, Mr. Faurote described the Wright airplane engines. In subsequent articles he described various machining operations: Aug. 8, the connecting rods; Aug. 15, the crankshaft; Aug. 22, the cylinders, and Aug. 29, the crankcase.



PULLING a Dismantled Production Engine (Right) Back on the Secondary Assembly Line. All Army and Navy engines after primary assembly are tested for 5 hr., then completely torn down and inspected and re-assembled. Then they are given a secondary run-in test for 2 hr.



SECONDARY Assembly Line of Whirlwind Engines Is Shown at Left

Inhibitors in Pickling Process

Experiments Show That Only Enough Acid Is Consumed
to Remove Scale—Hydrogen Evolved Reduces
Inhibitor Rather Than Replaces Metal

BY ALLISON D. TURNBULL*

IT is a well known fact inhibitors have a two-fold purpose in the pickling bath, namely, to prevent the reaction between acid and metal and to reduce acid evaporation from the surface of the bath. Generally speaking, the latter is a result of the first mentioned.

Steam cannot be entirely prevented from issuing from a pickling bath; it would be against the laws of aqueous tension and vapor pressure. But the protective coating that forms on a bath containing inhibitors will stop much of the steaming. The comparative vapor tensions of the atmospheric layer immediately above the blanket cannot be in equilibrium with the attenuating layer of the pickling solution found just beneath this foam coating. The coat is frequently punctured, acid being carried over in the steam bubbles, an action which can be compared to break-down of an overcharged condenser.

A more stable condition may indeed be secured if the solutions are indirectly heated, i.e., by closed pipe systems made of non-corrosive metal. Shooting live steam into a pickling vat causes dilution of the acid and creates eddy currents that sweep the inhibiting substance away from the surface of the metal.

Inhibitor Should Not Be Proportioned to Make-Up Acid

Unless a correct balance is achieved between the inhibitor and the conditions that influence the cleaning, efficient action cannot be expected. The amount of acid added from time to time is frequently but erroneously taken as a criterion of the proper quantity of inhibitor necessary to prevent the actions mentioned in the first paragraph. This misapprehension is responsible for a control that gives only more or less satisfactory results. There are other factors that should be taken into consideration; for instance, the diameter of the steel rod to be cleaned has a distinct bearing on the amount of inhibiting substance, inasmuch as the surface area of the metal is governed by the diameter, and the action desired is distinctly a surface effect.

When steel rods are cleaned in dilute acid, the oxide scale first succumbs; after the metal is laid bare the steel begins to corrode. Hydrogen gas is evolved, which causes the surface of the metal to become embrittled. This action is more intense when the percentage of acid is low, necessitating long cleaning periods. Rough, embrittled surfaces offer ample secretion for occluded hydrogen, which if left in the metal will cause breaks in the drawing dies because of the ineffectiveness of the lubricant. In passing, it might be remarked that it is imperative that moisture be kept out of all wire drawing greases or soaps, used in the dry drawing process.

In dilute acids having no inhibitor, the greater the surface to be pickled, the greater the metal lost. Curve 1 shows the evolved hydrogen gas that accompanies over-

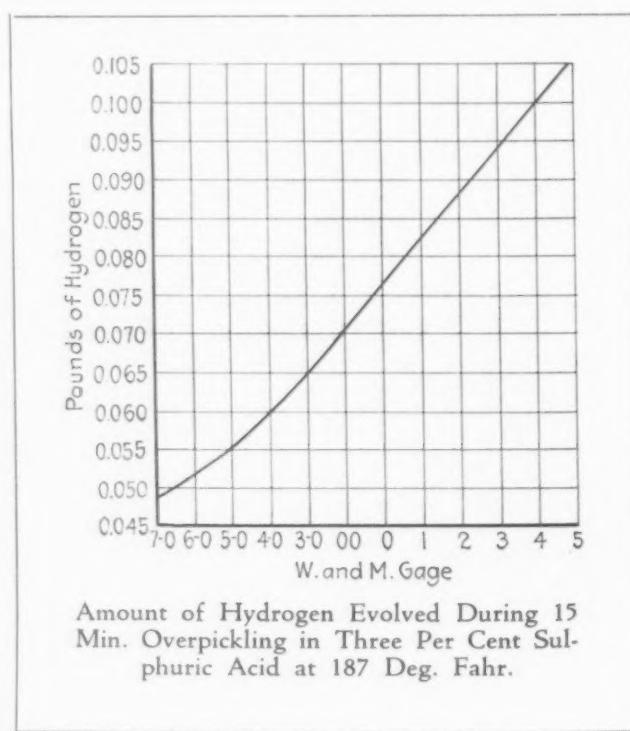
pickling various sizes of rods for 15 min. in a 3 per cent solution of sulphuric acid (by weight) at 187 deg. Fahr.

Pickling Without Inhibitor Forms Hydrogen

When one ton of rods having a diameter of 0.207 in. are overpickled for a period of 15 min. in a 4.21 per cent sulphuric acid solution at 200 deg. Fahr., 30 lb. of iron dissolves, according to the following equation:



For each pound of ferrous iron dissolved there is 0.036 lb. of hydrogen gas liberated. (If the solution is highly oxidizing the change from the ferrous to ferric sulphate occurs almost instantaneously.) Hence in the case under consideration 0.036 times 30 or 0.108 lb. of hydrogen was set free. Similarly in overpickling a No. 4 gage (W. &



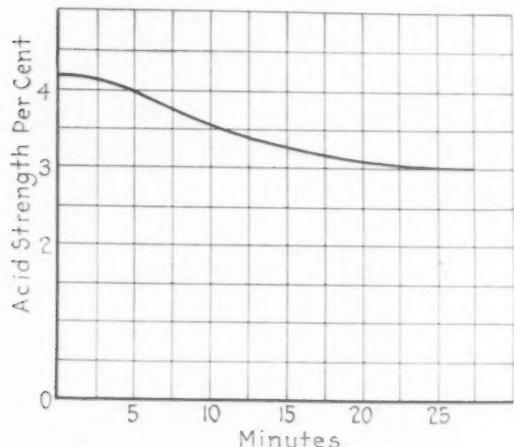
M.) wire rod, which incidentally has a smaller surface, 0.100 lb. of the gas was liberated. These calculations follow curve 1 very closely.

Curve 2 pictures what happened in the above pickling bath where the 30 lb. of iron were dissolved. For the first minute or two the acid is not affected because the metal is absorbing heat from the solution. At three minutes the acid was rapidly attacking the oxide scale, continuing for another 9½ min. At this time all the scale was removed and the acid concentration had fallen from 4.21 to 3.4 per cent, a loss of 0.8 per cent. After

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this the curve still droops, indicating that acid was being consumed. At 27½ min. the rods were removed; the bath had only 3 per cent acid. (The stock selected for the test was medium carbon steel, having a moderate scale.)

This example shows the utter waste of both metal and acid that accompanies improper pickling. The rods were practically free of any oxide film at 13 min. but a



Consumption of Sulphuric Acid When Pickling 0.207-In. Rods at 200 Deg. Fahr.

few spots remained, necessitating further immersion, during which time the acid was free to attack the steel of the rod as well as the spots of oxide.

Pickling With Inhibitor Forms Water

Compare this with curve 3, representing a pickling solution that is properly inhibited. The action in such a case is as follows:



Instead of the harmful hydrogen gas being produced, water only is formed.

As a case in point, steel rods of the type usually classified as "white ends," having 0.04 per cent carbon, were pickled for 28 min. in a 4 per cent sulphuric acid bath. The inhibitor was a very cheap substance found to suit the average pickling vat. It can be seen that the acid concentration dropped 0.5 per cent in 10 min. and at 15 min. from the start was at 3.45 per cent; thereafter it remained constant until the batch of rods was removed. One infers from this that the scale was practically removed in the 15-min. period; after that time the acid remained dormant.

Vats used for all these tests were of the standard groove fit, wood construction. The capacity of each was exactly 1006 imperial gallons. Although live steam is utilized for heating, all steam valves were tightly shut during the trials. Before the test was made the accurate weight of the batch of rods was taken, viz., 2144 lb. During the pickling the loss in weight was exactly 36 lb. or 1.67 per cent. The specific gravity of the bath before and after the trial was 1.08 and 1.0836 respectively. The total percentage drop in the acid was 0.55 per cent and the consumption was 55 lb. of 66 deg. Baumé sulphuric acid.

Theoretically, the amount of 100 per cent acid necessary to remove 36 lb. of ferrous oxide is 49.1 lb., which is equivalent to 51.5 lb. of 66 deg. Baumé acid.

The difference between the theoretical and actual usage is 3.5 lb., which is creditable indeed. When it is considered that there was some evaporation and that no

tub is 100 per cent efficient, the figures are remarkably close.

Proof That Steel Is Not Attacked

As was previously stated, 36 lb. of scale was removed during the pickling. To further show that the acid did not attack the steel base, a check can be made in the following manner:

Weight of solution before the rods were immersed is: 1106 gal. x 1.08 sp. gr. x 10 lb. or 10864.8 lb.

Similarly the weight of the solution after the test is 1106 x 1.0836 x 10 or 10901.0 lb.

Difference in the two values = 10901.0 — 10864.8 = 36.2 lb., the amount of iron oxide removed from the rod combining with acid to form ferrous sulphate and water.

Inhibitor Is Essentially Cellulose

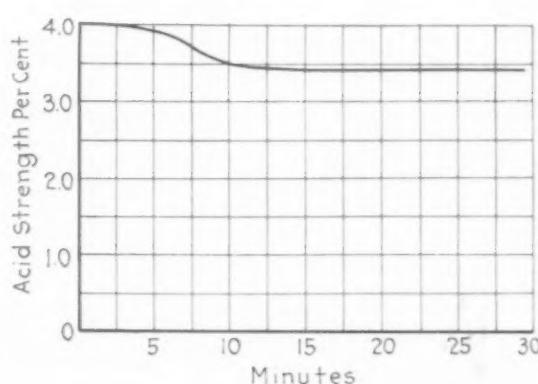
The question now arises, just what is an inhibitor? Inhibiting action is undoubtedly due to organic substances present in the compound. Carbohydrates having a high value of the carbo-hydrogen radical, such as sugar ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) or starch ($\text{C}_6\text{H}_{10}\text{O}_5$) have good inhibiting qualities. We might go further up in the scale and say that the supposedly existant $\text{C}_{100}\text{H}_{200}\text{O}_{100}$ is the formula of a true inhibitor.

If cellulose be placed in a dilute solution of sulphuric acid which is evolving hydrogen from a metal, the following reaction occurs between cellulose and water



While $\text{C}_6\text{H}_{12}\text{O}_6$ is in the process of formation all the free hydrogen is powerless to attack the metal. Pure cellulose could be used in pickling solutions, providing that there was a correct amount of the substance placed in the bath. Too little would be inefficient, while too much would be a waste.

What takes place in a pickling bath when an inhibitor is present? Many theories have been advanced. Observa-



Consumption of Acid Containing Proper Inhibitor

tions taken over a period of eight months, using four different classes of inhibitors, lead the writer to believe that a highly reducing condition must be created in the solution.

Numerous bodies with sluggish reactions are capable of chemical combination at the instant they break away from another compound. Speaking generally, when a chemical change occurs between molecules, there is, first of all, a decomposition of the molecules and then a rearrangement of the constituent atoms to form new molecules. But an appreciable amount of time necessarily elapses while the atoms are falling into the new arrangements; during this momentary freedom or nascent state,

the atoms act as individuals, and enter into combination more easily than if held in restraint by the forces binding them into molecule.

In the case of inhibitors the hydrogen acts as a reducing agent by actually entering into the molecule.

Carbohydrates like dextrose and glucose are highly reducing. For instance if we place a quantity of starch into a dilute solution of sulphuric acid at 120 deg. Fahr., and add an alkali to neutralize the acid, we have a reducing solution. This fact is utilized in metal plating, where the solution must be of a reducing nature.

Returning to the example previously considered, of a bath of acid ranging around 4.21 per cent at 190 deg. Fahr. Suppose we add a measured quantity of inhibitor of such a grade as associated with "mill wheat" (such substance being capable of releasing 76 per cent of cellulose under proper conditions). It seemingly dissolves. We then immerse a batch of rods in the solution, and shortly thereafter particles of ferric oxide and ferric sulphate can be observed floating to the surface of the bath. The mucilaginous character of the inhibitor binds these substances into a thick, reddish brown coating. The bath is now in a reducing condition. A sample of the solution when examined under a polariscope shows a distinct rotation of the plane of polarized light, nearly always toward the right, indicating that dextrose has been formed, but possibly there has been a formation of glucose, since it gives the same indication (both these are isomeric compounds, i.e., they have the same composition although with different properties, since the atoms are located differently in the molecule).

What Happened When Rods Were Overpickled

Nascent hydrogen tends to oxidize the dextrose, hence it is not capable of plating out on the metal, and hence the metal does not dissolve.

Consider again the first example where a ton of 16.5-gage rods was overpickled for approximately 15 min. and 30 lb. of iron was dissolved. The hydrogen liberated in this instance was 0.108 lb. Referring to the formula:

$H_2O + C_6H_{12}O_6 = C_6H_{12}O_5$ it is seen that for each pound of the inhibitor ($C_6H_{12}O_5$) there is 0.0123 pounds of hydrogen oxidized to H_2O . Actually the substance used in these trials was composed of 76.4 parts cellulose ($C_6H_{12}O_5$) so 1.31 lb. of it must be used to take up 0.0123 lb. of the gas.

But there happened to be 0.108 lb. of hydrogen evolved in this process, necessitating $\frac{0.108 \times 1.31}{0.0123} = 11.5$ lb. of inhibitor.

From experiment it was found that 11 to 12 lb. of the substance was necessary to give the results obtained in the second trial. It will be remembered that this was the test where the acid did not react with the metal after the oxide was removed. Consequently, practice bears out the theory.

Amount of Inhibitor Added Decreases With Age of Solution

A sufficient quantity of the substance must be added from time to time in order to make up for depreciation and losses sustained when the rods are removed from the vats. It was found that once the salting charge was given, i.e., 11.5 lb., a tapering amount was necessary to continue the protection. Usually one pound was added with each ton charged. Such additions were made five or six times. Following batches then receive an amount that varies from $\frac{1}{2}$ lb. down to $\frac{1}{4}$ lb. per ton of charge. The last two batches do not require any inhibitor. The average consumption over a period of say one month ranges between $\frac{3}{4}$ and 1 lb. per net ton of rods pickled.

Curve 1 shows the fact that as the gage of the rod decreases, the hydrogen gas capable of being evolved from that rod also decreases. This curve is true for all sizes of wire and rods when they are overpickled as noted, i.e., for 15 min. in a 3.0 per cent solution heated to nearly 200 deg. The real criterion determining the amount of inhibitor is the square feet of surface of metal to be cleaned.

During an average month, using the inhibitor under discussion, 2594 tons of rods was cleaned. Exactly 132-100 lb. of 66 deg. acid was consumed doing this work, or an average of 50.9 lb. per net ton. Pains were taken to secure accurate data regarding the amount of oxide on an average rod, the result being 1.7 per cent. Theoretically 48.3 lb. of acid would be required to remove this quantity of scale from one ton of stock, leaving a difference of 2.6 lb. per net ton between the actual usage and the theoretical. It is understood that the solutions are not "killed" down to such a weak concentration that a long period of time would be necessary for the pickling operation, consequently there was always some free acid remaining in the bath when it was discarded. This accounts for most of the 2.6 lb. surplus.



Airplane Disaster Caused by Fatigue of Steel

FRACTURE under fatigue of studs in the front big-end bearing of the starboard engine is found to be the cause of the disaster of the London-Paris airplane which, on June 17, plunged into the British Channel, killing several passengers. A report, recently issued by the British Air Ministry, based on a formal investigation, states that this was the primary cause, according to the London *Iron and Coal Trades Review*.

Speaking in more detail, the report says that this mishap is described as of a type which is unavoidable. The report also is to the effect that Major Cooper's detailed examination revealed that the front, or No. 4, connecting rod assembly was completely broken up, obviously the result of a fracture of the big-end bearing studs. According to his opinion, with which the court agrees, the pair of studs on the port side of the bearing fractured due to fatigue, the front stud being the first to fail, followed by the two studs on the starboard side also failing. None

of the damaged or broken parts was discolored by heat, so it was said.

After a careful consideration of the evidence, which dealt exhaustively with the manufacture of these studs and the suitability of the steel used therein, the court gave out the opinion that nothing that human foresight could have done, in providing against this primary cause of the starboard engine becoming relatively useless, had been omitted either by D. Napier & Sons, Ltd., or on the part of Imperial Airways, Ltd., or their personnel. "It is a case," says Sir Arthur Colefax, author of the report, "similar to many with which all who have to do with machinery are familiar—the metal of some part becoming fatigued for some reason which remains an unsolved mystery. Evidence was given of an almost identical mishap to an engine in an R. A. F. machine, and also of some few other instances of studs failing. Such evidence has not enabled me to carry the matter any further."



Work in Process Is Stored in Skids in the Yard. At the end of article is shown the steel storage yard

Handling forgings, Dies and Stampings in Transue & Williams Plant

THE trimming presses are arranged in two lines and have a belt conveyor beneath each row of machines for carrying the forgings and another conveyor belt running in the opposite direction between the line of machines and located slightly above the floor level for handling the scrap. The forgings fall from the trimming presses to the conveyor belt and the press operator throws the flashings to the scrap belt.

At the end of the press line the scrap belt goes up a slight incline and the scrap is dumped from the belt into the hopper of a dump body skid in which an electric truck carries it to a baling press. All the forge shop scrap, except very heavy flashings, is baled.

The two belts carrying the trimmed forgings turn up an incline at the other end of the presses and then move along in a horizontal position for a short distance, providing ample space for inspection and sorting, which is done while the work is moving. Various kinds of forgings are moving on the belts at the same time and the inspectors throw each type in the proper skid. The receiving skids are placed in a row along the outer sides of the belt conveyors. The defective pieces are thrown into small tote boxes.

The trimming presses are individually driven through belts from motors located above the machines. The majority of the presses are of the Toledo make.

Tools and spare keys for setting the dies are conveniently carried in metal tables mounted on castors, one table being provided for six presses.

Three methods of cleaning are used, pickling, shot blasting and tumbling. Trimmed forgings after sorting

WHAT constitutes the furnace equipment for a modern forging plant supplying forgings of a wide variety of size and weight was described in THE IRON AGE of Aug. 22, page 467, drawing on the practice and experience of the Transue & Williams Steel Forging Corporation, Alliance, Ohio, for this purpose. The present article is devoted to arrangements for handling, to three methods of cleaning forgings and to provisions for storing and preparing steel.

go to a point where one of these three cleaning operations is done. Large forgings, such as rear axle housing forgings weighing up to 320 lb., are shot blasted on a rotary table machine. For cleaning No. 14 steel grit heat treated is used. Forgings in intermediate sizes are pickled. This is done in a separate detached pickling building,

which is equipped with a 4-arm Mesta pickling machine with a 12,000-lb. lift. The building is 45 x 50 ft., 26 ft. high, with windows on all sides extending to the eaves.

Tumbling Smaller Forgings

THE smaller forgings are cleaned in two 48 x 60-in. continuous tumbling barrels located in the trimming department at the end of the press line. Each machine is served by a power loader designed so that a loaded skid is placed on the loader by a truck and the skid and its contents, about 2500 lb., is raised and the skid is dumped directly into the barrel. This is proving a highly economical handling arrangement. The forgings are rotated 20 to 30 min., and each machine has a capacity of 45 tons per day. Skids receive the forgings at the discharge end of the tumbling barrels. The tumbling mills were built by Ideal Industrial Machinery, Cincinnati.

A new arrangement has been provided in the handling of dies which is proving efficient. New dies are now prepared for the layout bench in the die storage building, which is equipped with two planers and a drilling machine for that work. Keyways and shanks are also put in the dies in this department. Then the dies go direct to the layout bench. With this arrangement it is not necessary to take the new dies to the regular die shop. The die

room is 100 by 200 ft. and contains about 75 machine tools used in die sinking. The die storage building is 52 x 175 ft. In it are stored 1800 sets of dies and there is sufficient room for 2500 sets. Dies are stored in steel racks, the width of which diminishes from the bottom shelf up, so that dies can be lifted from all shelves of the rack with an electric traveling crane. The racks are numbered and a complete filing system is kept for the dies.

The steel yard is conveniently arranged for the handling of stock. It is 600 ft. long and 60 ft. wide, its size being sufficient to store 5000 tons of material. The stock is carried in piles arranged according to types of material. The yard is served by a 15-ton gantry crane with a 60-ft. span. This unloads stock from cars to stock piles and also delivers it to a 4-wheel wagon at the entrance to the shear building. The wagon is moved a few feet to permit the stock to be picked up by a 5-ton electric traveling crane that serves the shear building and delivers the stock to the shear. This building is 60 x 120 ft.

Heavy Stock Sheared Hot

A HEATING furnace was installed recently in the shear house for heating plain carbon bars that are too large to cut cold or larger than 7½ in. in diameter and for heating alloy bars that if cut cold would sustain fracture. This is a continuous oil-fired pusher type furnace, 18 ft. long and 6 ft. 6 in. wide. The bars are heated to a temperature of 1000 to 1200 deg. for hot shearing. They pass

through the furnace on skid bars and are discharged upon an incline leading to an alligator shear and after shearing pass to a roller table. This shearing unit is so arranged that it may also be used for cold shearing. In that case the bars are handled without passing through the furnace.

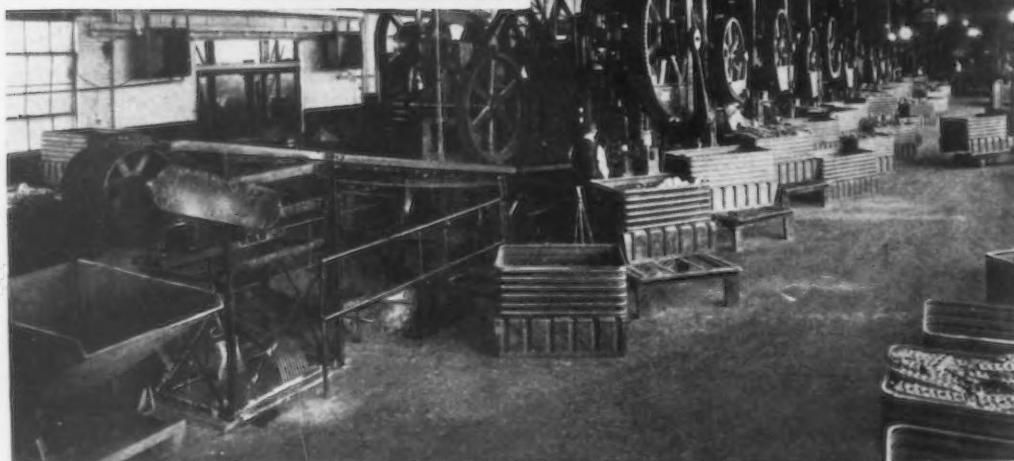
The shear house equipment includes a recently installed Pels shear with a capacity for shearing bars 7½ in. in diameter, three alligator shears, a guillotine and a friction saw with a 3½ ft. diameter cutting blade. As an auxiliary to the overhead crane the shear house has an industrial track extending through its center equipped with a car for handling stock. From the shears the stock is taken in skids to one of the three forging units as designated on a travel card.

The forging capacity has been increased by the recent addition of 20 hammers. The present forging equipment consists of 1000-lb., 1200-lb., 2000-lb., 2500-lb., 3000-lb., 4000-lb., 5000-lb., 6000-lb., 8000-lb., 10,000-lb., and 16,000-lb. steam hammers as well as 1000-lb., 1500-lb., 2000-lb., 2500-lb. and 3500-lb. board drop hammers; heading or upsetting machines ranging from 1 to 5 in. capacity and 2 bulldozers. In addition to replacing some of the larger hammers which are becoming obsolete, the company has placed orders for twelve additional new hammers, to be manufactured from its own design.

A central storeroom has just been completed in which practically all stores are kept. This is 80 ft. long and 40 ft. wide and has an 8-ft. balcony on each side. It is well



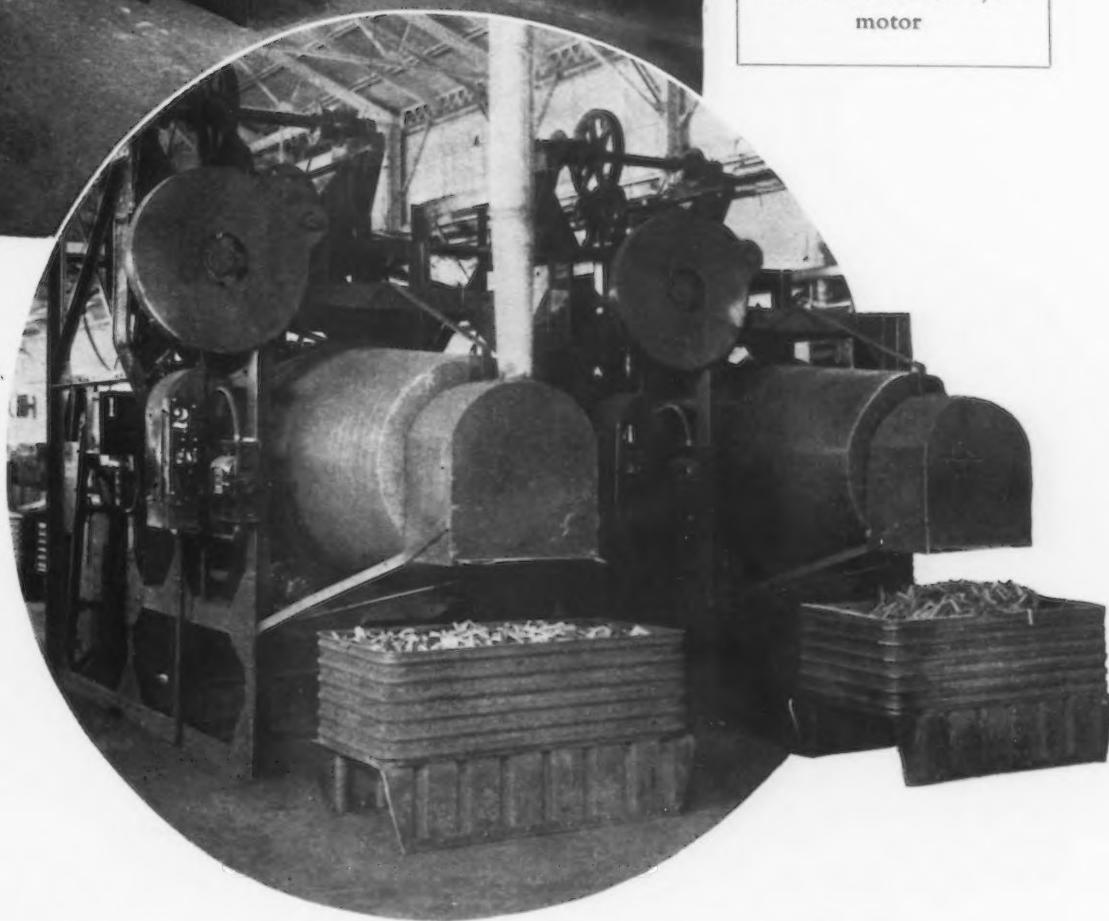
AT the Right Is Shown the Arrangement of the Trimming Presses in the Press Room and the Discharge End of Scrap Conveyor



B ELT Conveyors in the Cold Trimming Department Carry the Forgings from the Presses after Trimming. The forgings are inspected and sorted as they move along the belt and are thrown in the tote boxes back of the belts



C O N T I N U O U S
Tumbling Barrels
Are Located at the
End of the Trimming
Press Line. The forg-
ings after trimming
are dumped directly
from tote boxes into
the tumbling barrels,
electric trucks placing
the boxes in the hop-
per of the loader,
which is elevated by a
motor



THE Dis-
charge End
of the Tumbling
Barrels Are Pro-
vided with
Hoods and Con-
nected with an
Exhaust System
for Carrying
Away the Dust

lighted through a monitor roof. The inspection department consists of three divisions, hot, cold and final inspection. Shipping facilities are provided for handling 500,000 lb. of finished forgings per day. New departments include a chemical and metallurgical laboratory with 1500 sq. ft. of floor space and a hospital in a new building 16 x 36 ft., provided with first aid equipment.

The power plant equipment includes five 500-hp. Sterling boilers fired with Riley underfeed stokers and three Westinghouse low-pressure turbines, one of 1500-kw. capacity, one of 750-kw. capacity and one of 300-kw. capacity. A substation was recently built that enabled the company to purchase 1000 kw. of power from a commercial power company should a breakdown occur in its own power plant.

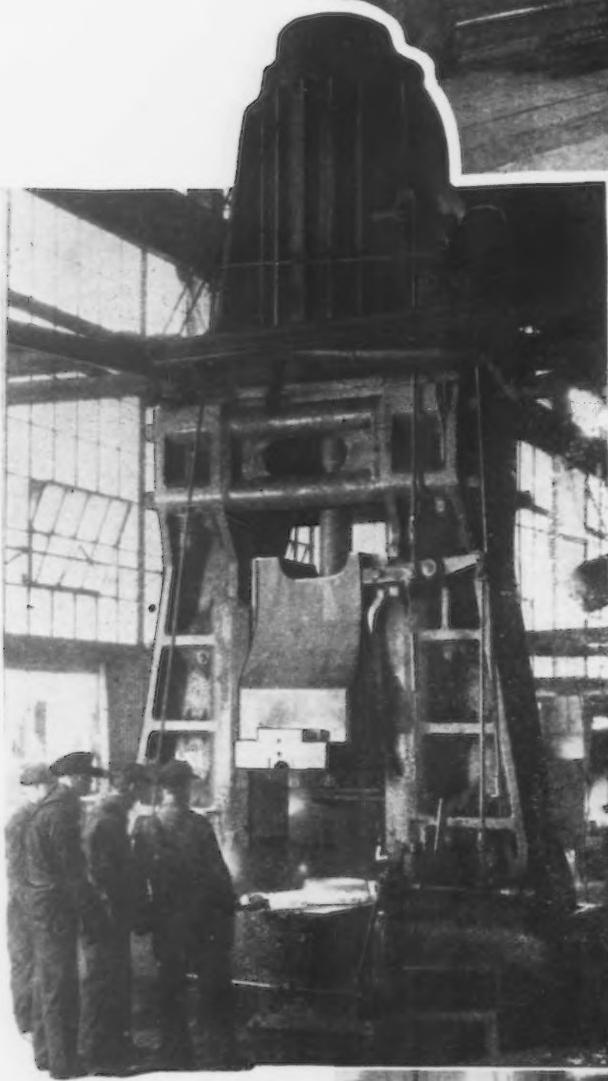
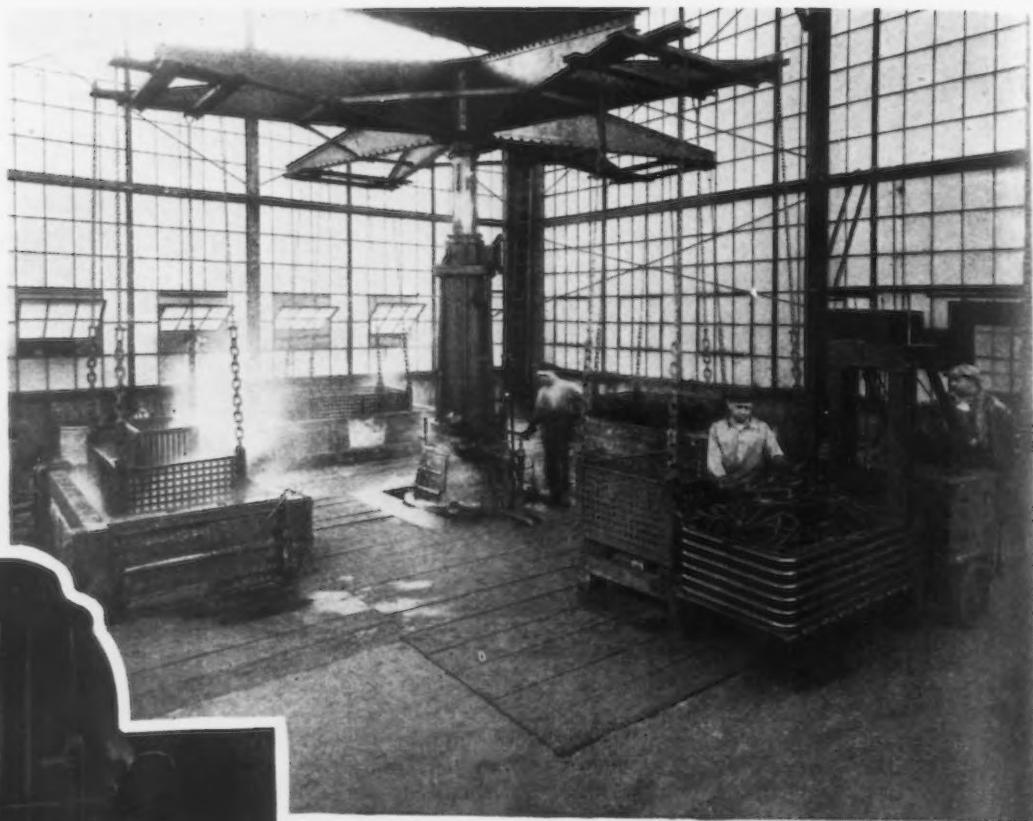
Stamping Department

THE stamping plant for the most part produces deep drawn stampings for the automotive and other industries. An overhead endless chain conveyor for handling

work in process was recently erected in this plant. Its use is resulting in a reduction in handling costs, speeding up production and materially cutting down the amount of work stored on the floor. This conveyor, 730 ft. long, loops around through the press room, assembly room, inspection, pickling and annealing departments and shipping platform. The conveyor has hooks on 20-in. centers on which the work is suspended and it moves 35 ft. per min. It carries all work in process in which there are larger than $\frac{1}{4}$ -in. holes, which comprises 60 per cent of the stampings. At various points the conveyor loops down from the ceiling, bringing it to a convenient level for loading and unloading. As pickling and annealing are required between press operations on nearly all deep drawn work, some of the work makes as many as three circuits of the conveyor.

Annealing is done in a continuous oil-fired furnace 22 ft. long provided with a chain type conveyor consisting of four chains that run in alloy steel channels. Work remains in the furnace 2½ to 3 min. The furnace tempera-

BANJO Axle Housings for Trucks Are Forged on a 16,000-Lb. Steam Hammer, the Largest in the Plant (below)

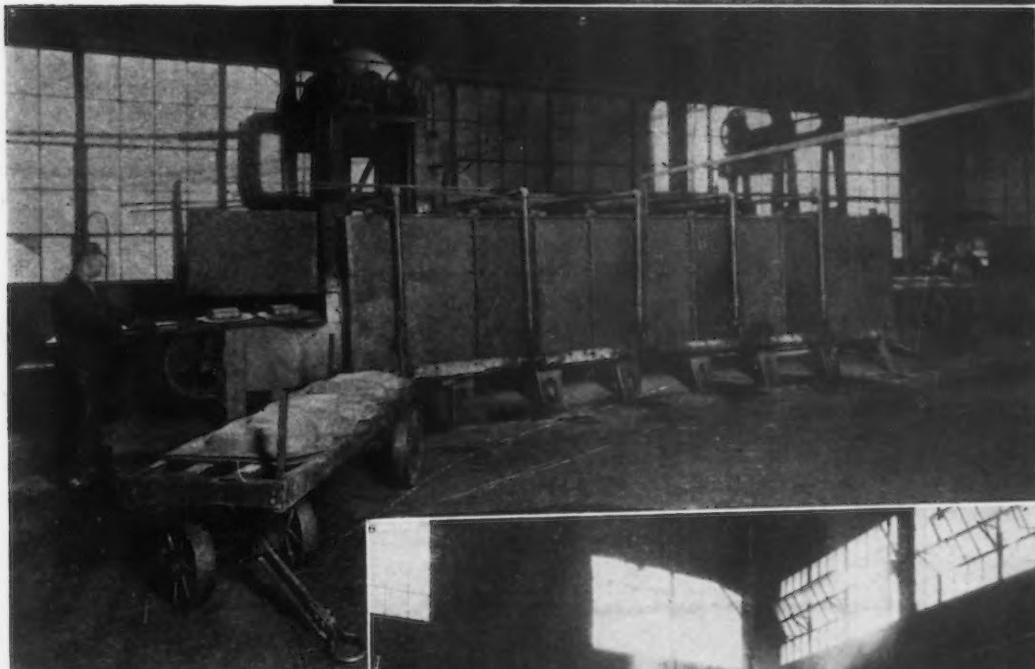


AT Right, View Down the Center of the Light Hammer Shop

THE Pickling Department for forgings, with its Mesta Machine, is located in a separate high-roofed building with glass on all sides, affording good ventilation and light (above)



PRESS Room in the Stamping Plant Has an Endless Chain Conveyor for Handling Material in Process



STAMPINGS (At Left) Are Annealed in a Continuous Oil-Fired Furnace

PICKLING Tanks (At Right) in the Pickling and Annealing Department of the Stamping Plant





ture, which is under thermostatic control, is 1450 to 1700 deg. Fahr. Hoods connected to 24-in. stacks are located at the loading and discharge end to carry away the heat and fumes.

Recently construction was started on a new die room for the stamping plant. This is of the most modern daylight construction, 65 x 160 ft. New modern equipment for the manufacture of stamping dies is being installed and the building will be provided with two cranes for the efficient handling of large dies. A battery of six new Toledo presses has been ordered and will be installed within the next 60 days.

The aim of this company is to diversify its output. Extensive development has been under way for some

months in forgings and stampings for industrial applications other than automotive, so that the fluctuation in automotive production will no longer affect the output or earnings of Transue & Williams. A good share of the output is now being taken by the electrical manufacturers, conveyor manufacturers, packing houses, boiler manufacturers, agricultural implement manufacturers, machine tool manufacturers, golf club manufacturers, etc.

The Transue & Williams plant occupies a 32½-acre site and includes 28 buildings with a floor space of 262,150 sq. ft. The company employs 1100 men. Its officers are J. R. Gorman, president; H. G. Sharp, vice-president and general manager; H. C. Senour, secretary-treasurer, and Charles T. Kingston, works manager.



A SECOND Hudson River Bridge at Poughkeepsie Has Reached the Cable Spinning Stage. Here is shown the gap between one of the two piers or towers and the shore anchorage. The bridge will be 4000 ft. long, with a 1500-ft. main river span. There will be a driveway of 30 ft. and five sidewalks

Fatigue Tests on Drums and Shells

Riveted Manganese Steel Drum Failed in Head; Riveted Carbon Steel Drum Did Not Fail; Welded and Forged Shells Failed at Tapped Hole

BY H. F. MOORE*



ADVENT of higher pressures in steam boilers has necessitated the use of plate material of increased thickness for the shells. This has appreciably affected the problems of design and manufacture of boiler drums. In the United States, riveted drums are in service for steam pressures up to approximately 800 lb. per sq. in., which seems to be about the limit for this type of construction. For steam pressures of the order of 1500 lb. per sq. in., solid or forged drums have been used. For pressure vessels other than steam boilers, drums have been built with welded seams in quite heavy plates.

In view of the highly satisfactory service obtained from riveted drums, it has seemed desirable to have a direct experimental comparison of strength between riveted drums and other types of drums, and also to make tests of drums with riveted seams using plate material of greater tensile strength than that of ordinary boiler plate.

Realizing that an ordinary static pressure test to destruction gives only a limited measure of the value of the construction used, the Babcock & Wilcox Co. has for some time been making tests on drum shells of various types under repeated applications of pressure. These experiments are still in progress, but it seems desirable to present certain results already obtained for information, with the distinct understanding that the conclusions here given are tentative and that further results may be expected as the tests proceed.

The apparatus described in this article and the methods of test developed have been designed and developed by the laboratory force of the Barberton plant of the Babcock & Wilcox Co. The writer has served as a special consultant in the conduct of the fatigue experiments.

The specimens tested were full size boiler drums, or shells of full size drum diameter (3 ft. to 3 ft. 6 in. inside). The expense and time necessary for preparing such specimens and making the tests was so great that comparatively few specimens have been tested. In making ordinary fatigue tests, six or more small specimens of each metal to be tested are subjected to various stresses, and usually some tests for each metal are run to

at least 10,000,000 cycles of stress. In this manner it is possible to determine the "endurance limit" for nearly every metal below which the metal in question will withstand an indefinitely large number of cycles of stress without fracture.

This method was not feasible for the tests of full size drum shells. It was decided to determine the relative length of endurance of specimens (that is, the number of repetitions of stress to failure), although this is by no means the best criterion of strength under repeated stress. However, in the ordinary service of a boiler the cycle of stress on the shell is repeated at most a few thousand times, and the stress is not reversed, varying from zero to a maximum with slight fluctuations near the maximum stress. Thus it was feasible to run the tests to numbers of cycles of stress greatly in excess of the number of cycles to be expected in the normal service of a boiler.

It is a well known fact that a very slight change in the stress, if it is above the endurance limit of a metal, will make a large change in the number of times that stress must be imposed to cause fracture. From his general experience with fatigue testing, the writer believes that a decrease of 33½ per cent in the stress might mean an increase in "life" of about 25 times. It would seem, then, to be a conservative statement that if, under test, a boiler drum shell withstood without fracture 150,000 cycles of stress varying from zero to a stress 50 per cent above working stress, it might be concluded that a similar drum shell made of the same material would not fail by fatigue under normal length of service at working stress.

The tests herein described were planned on this basis, applying repeated cycles of stress 50 per cent above the working stress to specimen drum shells, and noting the length of life before fracture, and the location and character of the fracture.

A diagram of the apparatus used is shown in Fig. 1, and photographs of the set-up at the Barberton shops of the Babcock & Wilcox Co. are shown in Figs. 2, 3 and 4. Water under a pressure of 1600 lb. per sq. in. is taken from the accumulator-controlled pressure mains of the plant. This water goes through a reducing valve to produce the pressure desired in the test, and then through

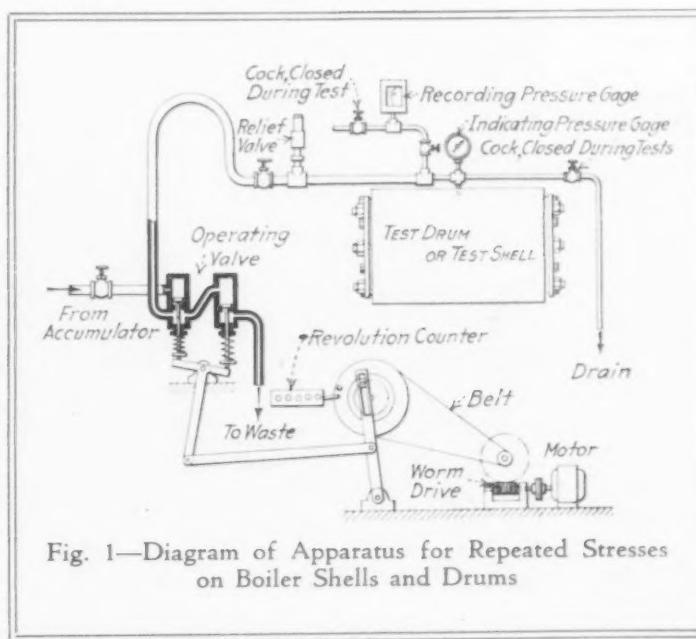


Fig. 1—Diagram of Apparatus for Repeated Stresses on Boiler Shells and Drums

*Research professor of engineering materials, University of Illinois; In connection with these tests, special consulting engineer with the Babcock & Wilcox Co.

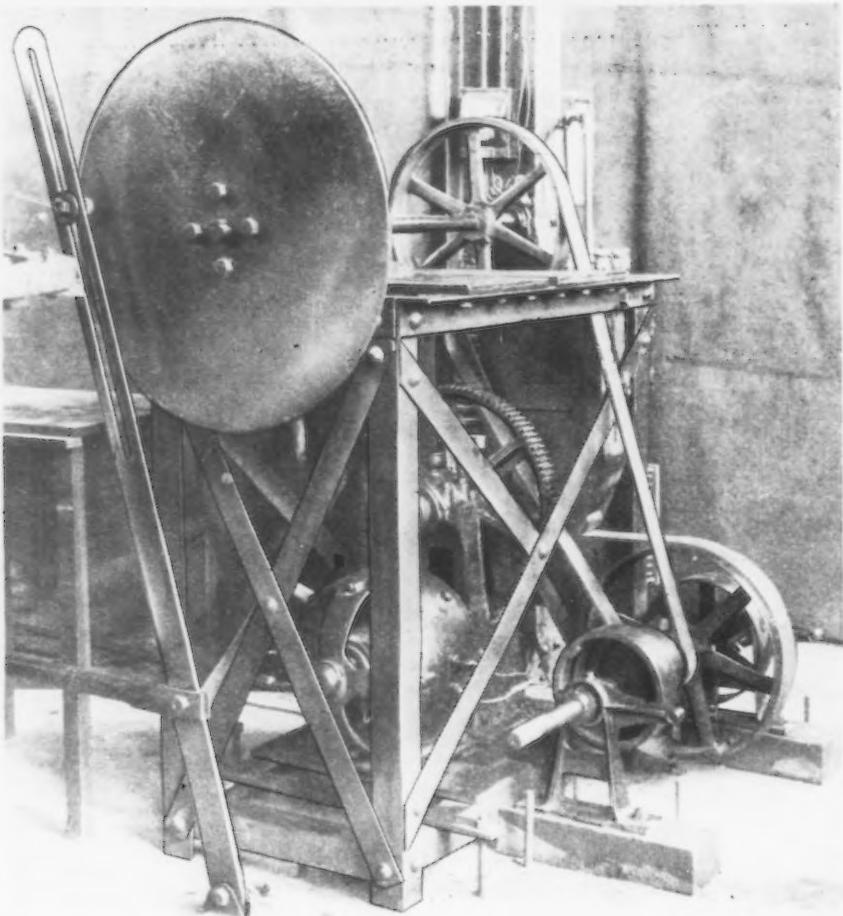


Fig. 2—Motor Drive and Link Motion for Operating Hydraulic Valves

a set of mechanically operated valves (Fig. 3), which alternately admit water under pressure to the test drum shell and allow the pressure in the drum shell to be relieved through the exhaust pipe. These mechanically operated valves are driven through link work by an electric motor whose speed can be varied, and the link work is fitted with a revolution counter which indicates the number of cycles of pressure applied. Several sets of such valves are operated by the one motor, and several test drum shells can be tested at one time. The pressure applied to each specimen is shown on a Bourdon gage directly attached to the specimen, and is also measured on a recording pressure gage. The equipment was ordinarily operated so as to give six repetitions of stress per minute.

In addition to observations to detect incipient fracture in a test shell (usually shown by leakage or a fine stream or spray of water), careful measurements of the minute changes of form under load were made. Some of these were made by means of a 2-in. Berry strain gage and others by means of micrometer dial gages attached to a framework supported from the test drum shell. The principal utility of the measurements of minute strain was to determine whether any marked permanent distortions of the specimens occurred as the tests progressed.

Two types of test specimen were used. The first, which was used for riveted construction, consisted of a drum shell with standard heads riveted to it. This type of specimen is referred to as a "test drum." The second type of specimen consisted of the test shell with an inner shell of smaller diameter, leaving an annular space between the two shells into which water under pressure was admitted. Figure 5 shows the general arrangement of this type of specimen, which is referred to as a "test shell."

Drums and Shells Tested

One of the specimens was a manganese steel test drum. The plate material in this specimen showed an analysis of 0.29 per cent carbon, 1.95 per cent manganese, 0.025 per cent phosphorus, and 0.036 per cent sulphur. Physical properties were: yield point 83,500 lb. per sq. in., tensile strength 106,500 lb. per sq. in., elongation in 8 in. 16 per cent, and reduction of area 36 per cent. The plate material for the remaining specimens was ordinary carbon steel boiler plate, and both the chemical analysis and the physical properties showed thoroughly satisfactory results for the metal in each specimen.

The designation of each test specimen, ruling dimensions of each test specimen, the type of joint, the range of test pressures and resultant computed stresses, the number of cycles

of stress for fracture, and the character of the fracture, are given in Table I.

Comments on Each Test

The manganese steel test drum was cold riveted. Slight trouble with the gaskets at the manholes occurred

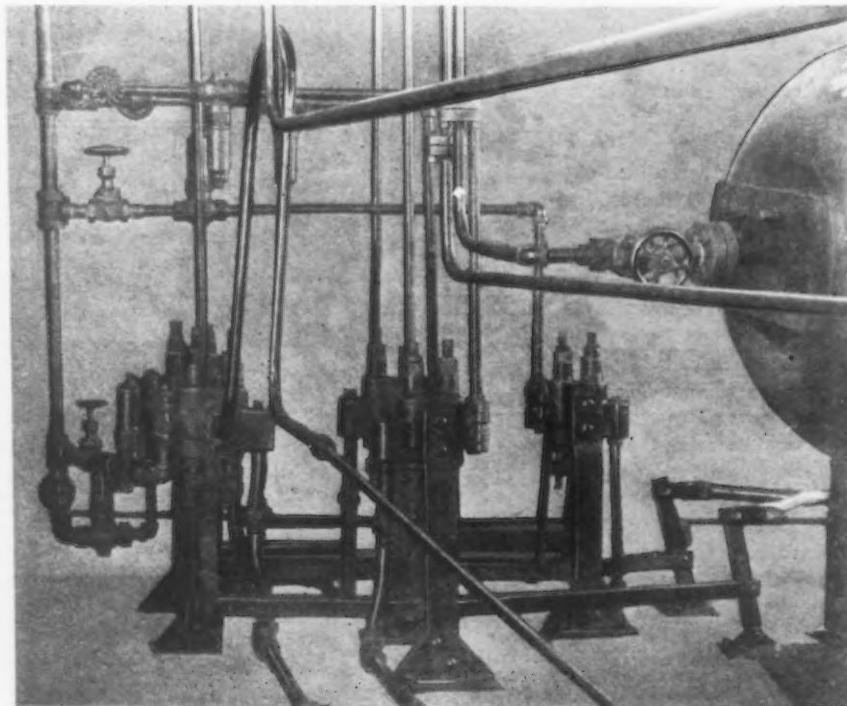


Fig. 3—Hydraulic Valves for Testing Several Drums Simultaneously

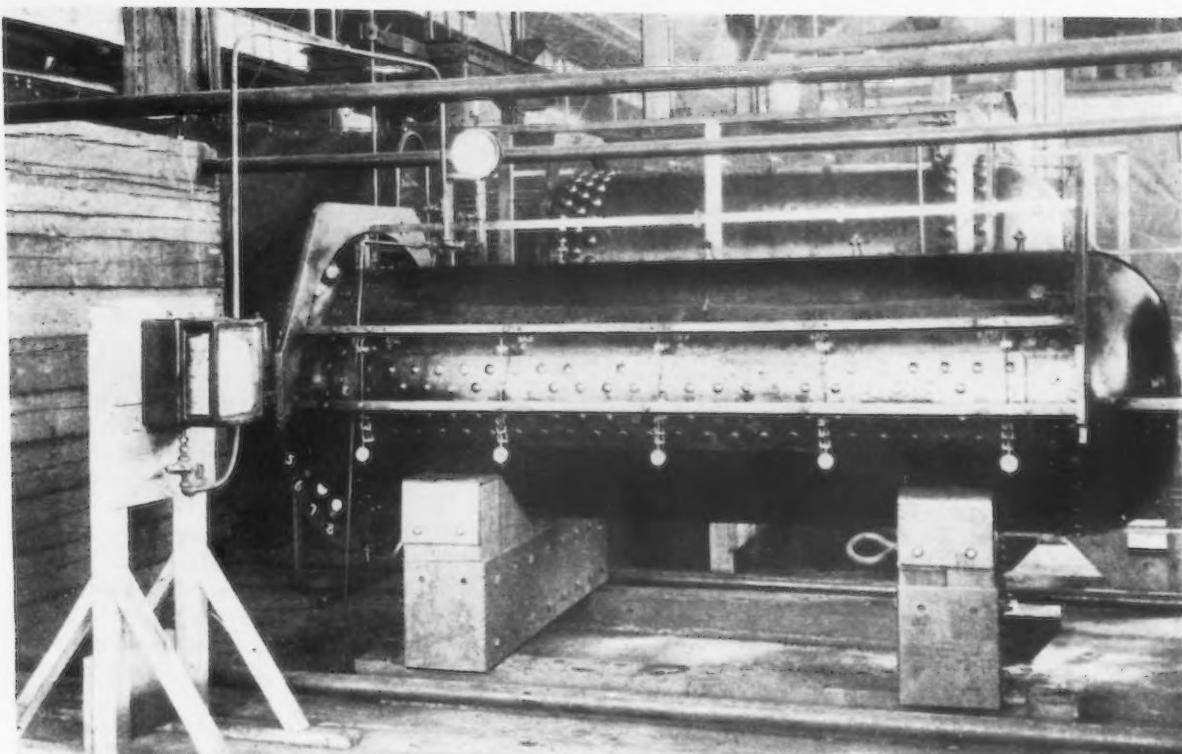


Fig. 4—Two Drums Under Test

during the first few hundred cycles of pressure. Between 3000 and 4000 cycles slight leaks appeared along the buttstraps and in one head seam. No leaks developed at the rivets. At 7100 cycles it was necessary to stop the test to replace a gasket on one manhole cover, and at this time the head seam was calked. The test was resumed, and after 45,000 cycles of pressure a slight leak appeared in both head seams. One of these leaks increased until at 65,000 cycles it was necessary to stop the test and recalk this head seam. Test was resumed, and at 92,000 cycles one manhole cover was replaced by a heavier cover. After 130,225 cycles a leak had developed near the manhole opening which was evidently a fracture. The test was stopped and examination showed a crack about $3\frac{1}{4}$ in. long located as shown in Fig. 6. The metal around this fracture was removed, a thin plate fitted into the hole and the rest of the opening filled with weld metal. The test was started again, but after 143 additional cycles of pressure the drum head split violently, as shown in Fig. 7. Examination showed a slight fracture extending into the edge of the shell. Strain measurements showed considerable variation, but no outstanding evidence of permanent distortion except in the immediate vicinity of the location where the original crack developed.

The A. S. M. E. standard drum (that is, one designed and constructed according to the provisions of the boiler

code) was riveted in the usual way. After 25,000 cycles of pressure had been applied minute leaks developed along the lower edge of a buttstrap and in both head seams. After 32,000 cycles the test was stopped and the seams calked. The test was resumed and after 431,000 cycles a very minute leak (about one drop per minute) developed at the bottom of one head seam. At 629,000 cycles slight leaks had developed along the lower edge and the end of one buttstrap. The test was stopped and the joints recalked; thereupon the test was resumed, a total of 1,013,840 cycles of pressure was applied without developing any fracture. The measurements of strain gave no evidence of permanent deformation during the test.

Arc welded test shell "A" is shown, in diagram, in Fig. 5. The stresses set up were practically pure hoop tension. Arc welding was done by hand, using ordinary bare welding wire. After 5530 cycles of pressure, fracture developed in the welded seam at the junction of base metal and weld metal.

Arc welded test shell "B" is also shown, in diagram, in Fig. 5. The seam was arc welded by hand, using a processed electrode (covered electrode). After 163,000 cycles of pressure, the longitudinal seam of the inner shell of the test apparatus fractured. This inner shell was repaired and the test continued. After 417,381

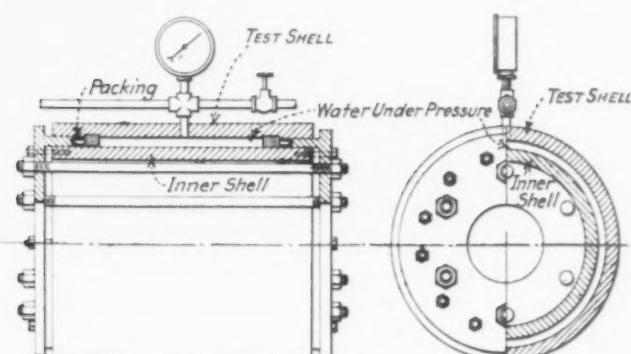


Fig. 5—(At Left)
Test Shell for De-
termining Fatigue
Strength of Weld-
ed or Forged Cyl-
inders

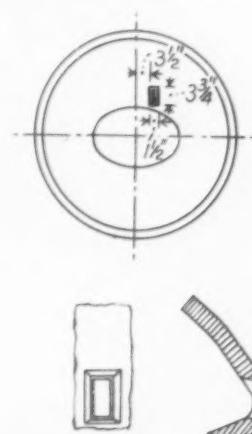


Fig. 6—Sketch of
Original Check in
Drum Head and
Method of Repair

cycles, the outer shell fractured, not in the weld, but at the tapped hole where the pressure gage connection was made. This is a point of stress concentration, and its significance is discussed later. During the test the strain measurements showed no sign of permanent deformation.

Arc welded test shell "C" is shown, in diagram, in Fig. 5. The seam was also welded, using a processed electrode. After 160,000 cycles of pressure the packing of the joint between inner and outer shells became loose. The test was stopped and the packing replaced; thereupon the test was resumed, and after 561,984 cycles the outer shell cracked at the gage connection (a $\frac{1}{2}$ -in. pipe thread). The failure was similar to that for arc welded test shell "B," and is shown in Fig. 8. The crack barely reached through to the outer surface, but was several inches long on the inside. During the test the strain measurements showed no evidence of permanent deformation in the steel test shell.

Arc welded test shell "D" was a duplicate of shell "C" in construction, type of welding wire used, and method of testing. After 435,883 cycles of pressure failure occurred at the gage connection, as in the case of shell "B" and shell "C."

The forged steel test shell was a forging without any longitudinal seam. After 20,000 cycles of pressure the inner shell of the test apparatus cracked in the longitudinal seam; it was repaired and the test continued. After 446,950 cycles the outer shell fractured at the pressure gage connection in a manner very similar to the fracture for arc welded test shells "B," "C" and "D." The strain measurements showed no evidence of permanent distortion.

Stresses Concentrated at Holes

It is obvious that, until many more tests have been made, nothing in the nature of final conclusions can be drawn as to the fatigue resistance of boiler seams. However, in view of the very meager amount of data concern-

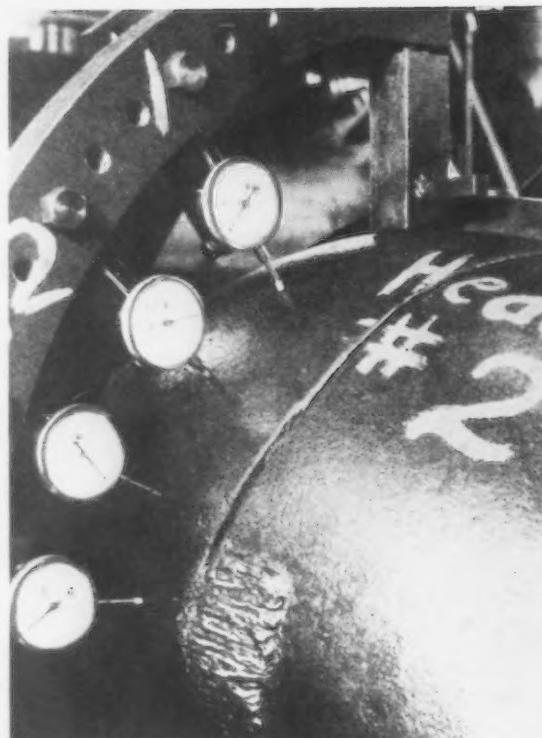


Fig. 7—Long Crack Skirting Edge of Welded Patch in Drum Head of Manganese Steel

ing the behavior under repeated stress of such seams, and of welded joints in general, these few test results seem worthy of attention.

In the case of the test shells which fractured at the tap hole for the gage connection, it is to be noted that according to the theory of elasticity such a hole would cause a stress-intensification at its edge amounting to three times the computed stress in the plate. The practical effect of such holes, as judged by repeated-stress tests seems to be less than this theoretical value. Haigh and Wilson¹ have made tests of specimens of structural steel under cycles of tensile stress varying from zero to a maximum, and they report a reduction of strength due to a hole of only a very slight amount for structural steel, although later tests showed a larger reduction for harder steel with a hole in it. Tests at the University of Illinois² on specimens of soft steel subjected to

cycles of reversed bending show a reduction of strength of about 50 per cent due to the hole. In this connection it is to be noted that the "A. S. M. E. standard drum" (line 2, table I), which did not fracture, had such a tapped hole in its outer shell. However, owing to the allowance for efficiency of the riveted joint, the stress at the tapped hole (which was some distance away from a riveted seam) was only 13,200 lb. per sq. in., as compared with 16,500 lb. per sq. in. for the stress at the riveted seam.

A fair value for endurance limit of boiler plate steel under reversed bending is 26,000 lb. per sq. in. For cycles of stress varying from zero to a maximum it may be expected that the value of endurance limit will rise to about 39,000 lb. per sq. in.³ This would indicate that the practical stress-concentration factor at the tapped hole in the case of the shells tested lay between $39,000 \div 13,200$

¹ (British) Association for the Advancement of Science, 1923. Report of Section "G."

² Bulletin 152, Engineering Experiment Station, University of Illinois, pages 25 to 34.

³ Moore and Krommers "The Fatigue of Metals," page 185.

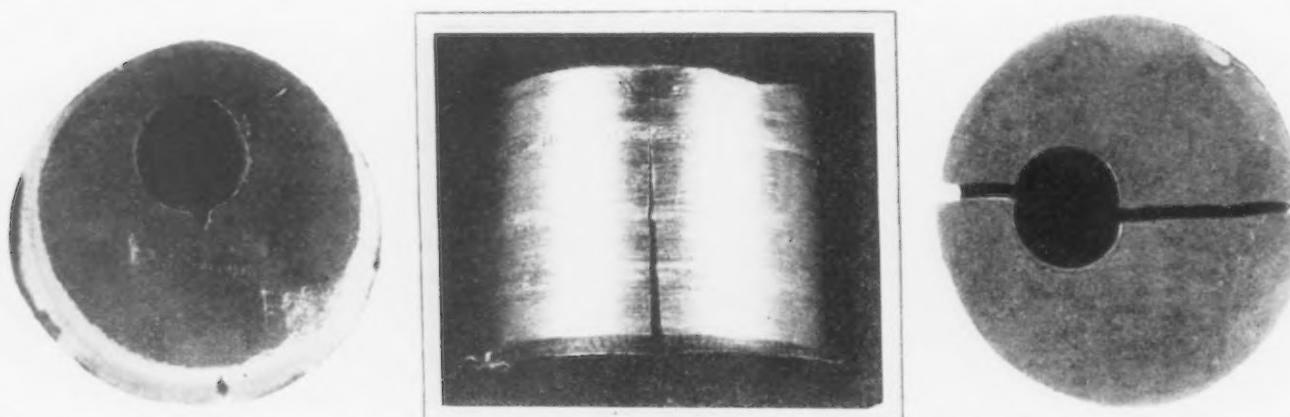


Fig. 8—Plug Specimen Cut from Arc Welded Test Shell C Where Broken at Tapped Hole for Pressure Gage. At left is view of outer surface of plate; in center is the side of the plug specimen, and at right the fracture shows open to a considerable distance on each side of the hole

TABLE I—SUMMARY OF TEST RESULTS
Lb. per Sq. In.

Specimen	Shell Dimensions			Efficiency of Joint, Per Cent	Max. Allowable Working Pressure	Range of Test Pressure	Range of Tensile Hoop Stress ^a	Number of Cycles of Pressure Applied During Test	Failure
	Inside Diameter, In.	Plate Thickness, In.	Longitudinal Seams						
Manganese steel test drum, riveted....	35 ^b	1.00	Two at 180 deg.	71	838	0-1,260	{ 0-31,500 0-22,400 ^b	130,225	Failure in drum head below manhole.
A.S.M.E. standard drum, riveted....	42	2.00	Two at 180 deg.	80	838	0-1,260	{ 0-16,500 0-13,200 ^b	1,013,840	No fracture
Arc welded test shell "A".....	42	2.00	One	100 ^c	1,047	0-1,570	0-16,500	5,530	In longitudinal seam near middle of length at junction of base metal and weld metal
Arc welded test shell "B".....	42	2.00	One	100 ^c	1,047	0-1,570	0-16,500	417,381	At $\frac{1}{2}$ -in. tap hole for gage, not at weld
Arc welded test shell "C".....	42	2.00	One	100 ^c	1,047	0-1,570	0-16,500	561,984	At $\frac{1}{2}$ -in. tap hole for gage, not at weld
Arc welded test shell "D".....	42	2.00	One	100 ^c	1,047	0-1,570	0-16,500	435,883	At $\frac{1}{2}$ -in. tap hole for gage, not at weld
Forged test shell....	42	1.875	None	100	1,047	0-1,570	0-18,000	446,950	At $\frac{1}{2}$ -in. tap hole for gage

^a Test pressure 1.5 times working pressure. Maximum stress under test pressure is 1.5 times working stress.

^b The higher of the two ranges is the range of computed stress through the line of rivets; the lower of the two ranges is the range of computed stress in the shell away from the riveted seam.

^c The efficiency of the welded joints is taken at the nominal value of 100 per cent.

and $39,000 \div 16,500$, that is between 2.95 and 2.36. Possibly the rather rough finish left by the tap, and the irregularities of outline due to the threads, may make this factor higher than would have been the case for a smooth drilled hole.

It should be noted that the riveted drum specimens stood up well under repeated cycles of pressure, and it seems in order to inquire why the stress-concentration at the rivet holes was not more in evidence. In the case of the "A. S. M. E. standard drum," the grip of the rivets on the plate may have spread the stress in the vicinity of the rivet hole. There also may be a factor affecting strength of riveted joints similar to the effect reported by R. R. Moore⁴, later checked by tests at the University of Illinois, who found that a single groove in a test specimen reduced the fatigue strength much more than did a series of grooves. Possibly a series of holes acts in a similar fashion.

⁴ Proceedings, American Society for Testing Materials, Vol. 26, Part II, page 225, (1926).

During the tests some corrosion of the metal was noted, but there is no apparent evidence that corrosion fatigue played an important part in the test results.

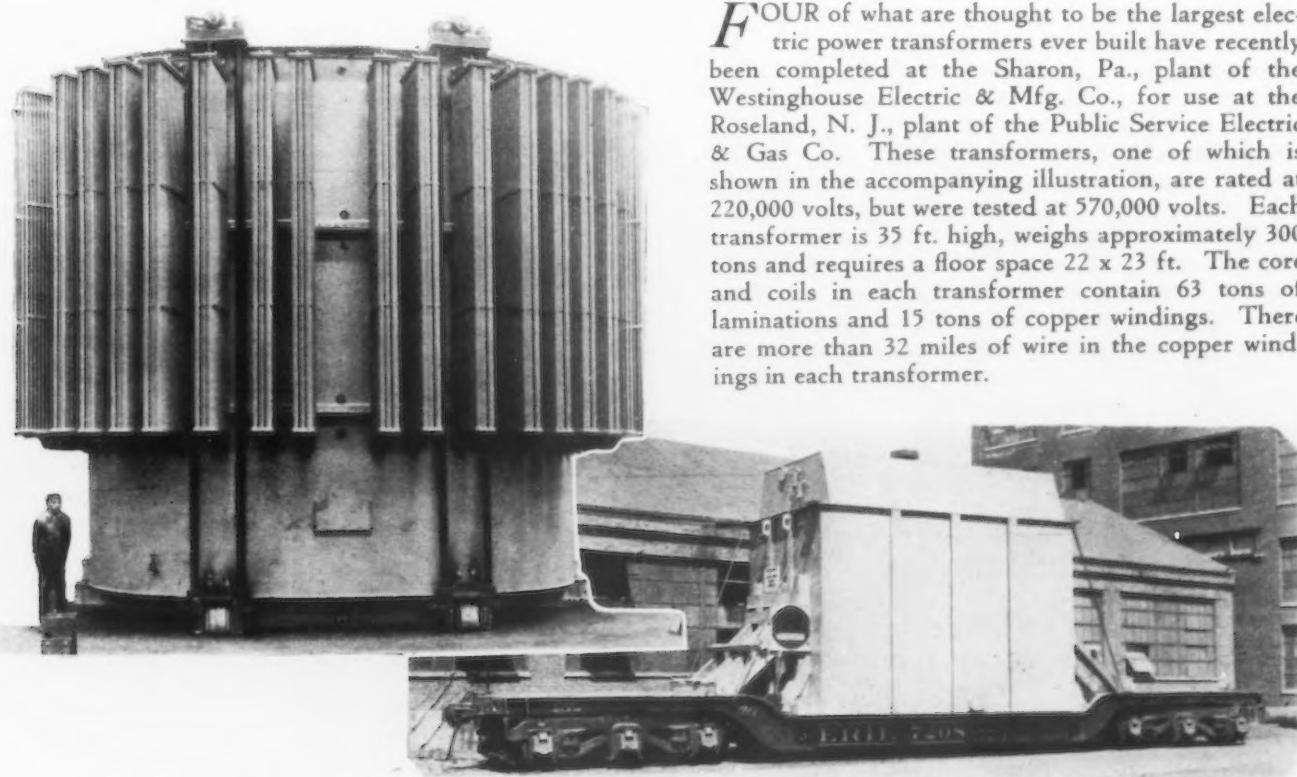
The results of these few tests do seem to furnish a basis for three conclusions:

(1) Welded joints in test drum shells have been made which do not weaken the fatigue strength of the shell as much as does the tapping of a hole for a gage connection.

(2) Welded joints in test drum shells have been made which withstood cycles of stress varying from zero to a value 50 per cent above the allowable working stress for more than 400,000 cycles. This is at least 50 times as many cycles as would be developed in the normal life of a boiler.

(3) The strength of a welded seam under repeated cycles of pressure is greatly affected by variation of welding practice. It is evident that, if it is expected to obtain welded joints at all resistant to repeated stress, it is very necessary to develop and maintain good, uniform welding practice, and carefully inspect the welding.

FOUR of what are thought to be the largest electric power transformers ever built have recently been completed at the Sharon, Pa., plant of the Westinghouse Electric & Mfg. Co., for use at the Roseland, N. J., plant of the Public Service Electric & Gas Co. These transformers, one of which is shown in the accompanying illustration, are rated at 220,000 volts, but were tested at 570,000 volts. Each transformer is 35 ft. high, weighs approximately 300 tons and requires a floor space 22 x 23 ft. The core and coils in each transformer contain 63 tons of laminations and 15 tons of copper windings. There are more than 32 miles of wire in the copper windings in each transformer.



To Melt 2200 Tons of Iron a Day

Enlarged Chevrolet Gray Iron Foundry Has 11 Cupolas
and 14 Continuous Molding and
Pouring Conveyors

BY FRED L. PRENTISS

ADAILY melting output of 2200 tons of iron is expected to be obtained in the enlarged gray iron foundry of the Chevrolet Motor Co., Saginaw, Mich. Large extensions to this plant were recently completed, more than doubling its capacity, and already 1875 tons has been melted and poured in one day.

Built in 1919 as the foundry of the Saginaw Products Co., a unit of the General Motors Corporation, this plant was enlarged and modernized in 1926. A description of the foundry as then equipped appeared in THE IRON AGE, April 8, 1926. With the shifting of foundry production work by the General Motors Corporation and the building of two large new foundries, the Buick foundry at Flint and the Oakland-Pontiac foundry in Pontiac, the Saginaw foundry that had been making cylinder blocks and other castings for Buick and Chevrolet cars became a Chevrolet foundry, and the name of this unit was changed accordingly.

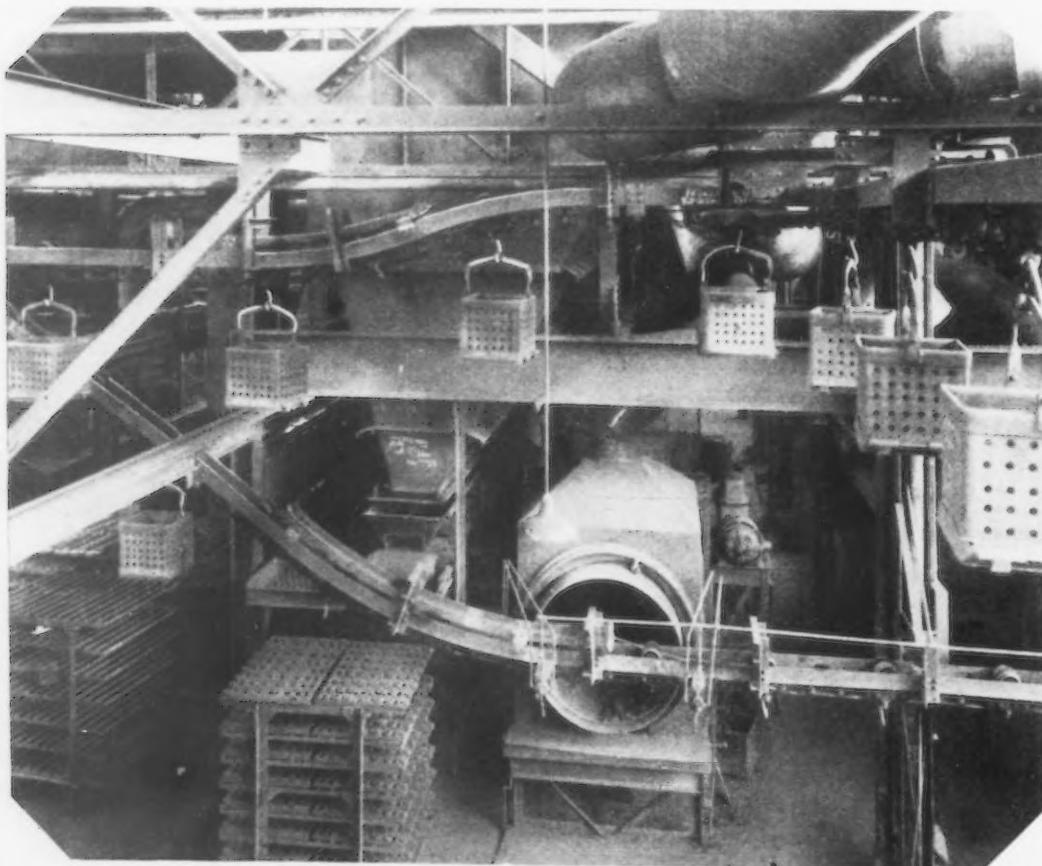
More Than Twice as Many Units

With the recent enlargement the number of cupolas has been increased from 5 to 11, and the number of conveyors for continuous molding and pouring from 6 to 14. The plant has been enlarged materially to provide ad-

ditional floor space to make room for the increased capacity. While the layout of the old foundry has been generally followed in the arrangement of the new equipment, the new portion of the plant has some new and interesting features in equipment and handling arrangements which represent developments that have been made in the foundry industry in the past two or three years. Probably the most important innovation is the change in the method of handling castings between the shake-out and the cleaning room.

Large production makes possible the provision of a separate molding unit for each of the more important smaller castings. In the new part of the foundry there are two mold conveyors for pistons, one for clutch housings, one for transmission housings, one for flywheels, one for tappets and two for miscellaneous small castings. Cylinder blocks are made on three of the old conveyors and cylinder heads on the other three.

The mold conveyors are of the run-around car type, which have taken the place of the drag line conveyors now being generally used. Cast iron cars on 4-ft. centers support the ends of ship channel sections 18 in. wide, which overlap the car, forming a continuous plate type



PASSING from the Shake-out to an Apron Conveyor, the Castings and Sand Are Delivered to a Revolving Screen (Shown in Lower Center). From this the castings are discharged into buckets, in which they are picked up, and after cooling while moving on this 1400-ft. conveyor, are delivered to the cleaning department

ONE of the Molding Units Used in Making Pistons. The pouring conveyor is shown at the side of the mold conveyor (At Right)

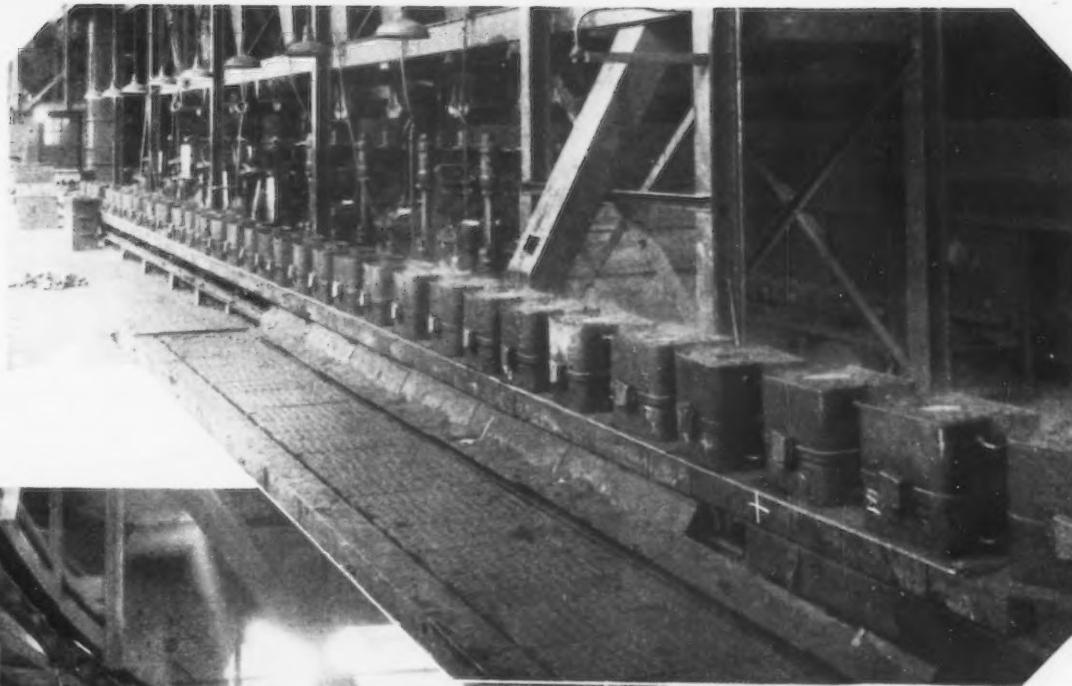


table which protects the rails and conveyor chain from falling sand and runouts and makes the table easier running and safer for the workmen. Each car is mounted on four bronze-bushed wheels with closed ends. The conveyor is driven by a drop forged chain suspended from the bottom of the cars, the drive being of the cantilever type.

Three of the mold conveyors are 220 ft. long, four 115 ft. long and one 161 ft. long. The conveyors have a speed range of 15 to 30 ft. a minute, the speed being adjusted according to the kind of molds being poured. At the side of the pouring zone are pouring conveyors 25 to 50 ft. long raised slightly above the foundry floor and moving at the same speed as the mold conveyors. Molds after pouring run around the end of the conveyor to the shake-out, passing beneath a hood on the return side for carrying away heat and fumes. Each unit has a power return flask conveyor. The molding machinery and other foundry equipment were supplied by William H. Nicholls Co., Inc., Richmond Hill, N. Y.

At the shake-out end the castings and sand are knocked out through a grating on to an apron conveyor. Gases and smoke are drawn away through a hood above the shake-out. The castings and sand are carried upward and discharged from the apron conveyor into a revolving screen located on the foundry floor. This screen is 54 in. in diameter and 10 ft. 4 in. long over all. The screen itself is a perforated plate 6 ft. long at the center of

the revolving barrel. The screen is set at a slight angle, so that gravity will cause the castings to move slowly through it while it revolves. At the discharge end the castings fall into baskets under an overhead castings conveyor or, if desired, can be discharged on to a truck.

The castings are carried in buckets suspended from this conveyor, which also serves as a cooling conveyor. The buckets are of perforated steel, about 2 ft. square, holding up to 800 lb. In front of the discharge end of the screen at the floor level is a turntable equipped with two air jacks. An empty basket is lifted off the conveyor and at the same time a loaded basket is hung on the conveyor by means of these jacks. The table is then swung around, placing the empty basket in the loading position. To allow them to cool off, before reaching the tumbling mills in the cleaning room, the castings travel overhead for about 2 hr. The cooling conveyor extends over hoppers above the tumbling mills, into which the castings are discharged by tripping the hinged bottom of the basket. From the hoppers they are discharged through gates into the tumbling mills.

Each molding unit has a screen for separating the sand from the castings. There are three castings conveyors, one serving three units. These travel from 3 to 12 ft. a minute, depending on the kind of casting. Each is 1400 ft. long, and the baskets are hung on 3-ft. centers.

Various advantages are claimed for this method of handling castings from the shake-out to the tumbling

COOLING Conveyor Carries the Castings into the Cleaning Room, Where the Loaded Baskets Are Dumped into Hoppers Above the Tumbling Barrels (At Left)

mill. As the castings are carried below the floor when shaken out, only the flasks remaining on the floor, there is less smoke and heat in the vicinity of the shake-out. The castings are always kept moving and less sand is carried into the tumbling mills than would be the case were the castings not carried through the revolving screen.

Sand-Handling System Carries Many Tons

The sand shaken from the castings in the revolution of the screen passes through the screen on to a belt conveyor beneath, over a magnetic pulley which removes the iron and is carried upward to an overhead sand screen. From this screen the sand is discharged into a pug mill, then passes through a conditioner and into a 75-ton storage bin. From this it is fed through cutting feeders on to a belt into a bucket elevator, which discharges it to a flight conveyor for distribution into the molders' hoppers. Each unit has its own sand conditioning and distribution plant.

In the new core room 100 tons of core sand is used an hour. In this department are 64 two-rack type oil-fired core ovens arranged in two batteries, each consisting of 16 ovens in a row placed back to back with another 16. These ovens are 6 ft. wide x 12 ft. 4 in. deep by 7 ft. high, inside dimensions. Each battery is fired with four 3-in. Multi-spray oil burners supplied by the Industrial Heating Equipment Co., one burner for eight ovens, automatically controlled by a Wilson-Maeulen automatic controller.

Three Melting Units Always Fired

The new cupolas are 9½ ft. in diameter, lined down to about 72 in. Three cupolas are always in use and are operated for nearly 22 hr. Because of the long period of operation, unusually heavy linings are provided in the melting zones.

An overhead crane delivers pig iron and scrap from railroad cars to the charging floor. The charging buckets are placed on an electrically driven scale-trolley, which is loaded by hand. Five of these trolleys run across the charging floor at right angles to the row of six cupolas, their tracks being slightly below the charging floor level. When a bucket is loaded the trolley moves it forward to a point midway between two cupolas. Here the bucket is on a level with a gravity conveyor that extends both ways in front of the cupola. Beneath the gravity conveyor there is an air hoist which pushes the buckets either to the left or right in front of a cupola door and at the same time places an empty bucket on the trolley. The loaded bucket is delivered in the cupola by an overhead crane.

Coke and limestone charges are handled on the oppo-

site side of the cupolas. With the exception of the way these materials are charged in the cupolas, the method of handling coke and limestone is similar to that used in the foundry of the Buick Motor Co., described in THE IRON AGE of Nov. 27, 1927. Coke is dropped from railroad cars into a track hopper and carried up in a fully automatic skip, which delivers it into a cab-equipped larry car. This discharges the material into storage bin back of the cupola.

From the bin the coke is drawn out through double gates into the basket of a scale-equipped charging machine. This charger travels the full length of the floor back of the cupola and can be spotted in front of any cupola. The coke basket is run into the cupola, and the bottom of the basket pulled out under the load, giving an even distribution of the coke through the area of the cupola.

The mold conveyors, casting conveyors, sand-handling equipment, coke and limestone-handling equipment were built by the C. O. Bartlett & Snow Co., Cleveland. The Whiting Corporation supplied the cupolas and the material charging equipment. The tumbling mills were built by the W. W. Sly Co. The new core ovens were built by Holcroft & Co., and the core-sand mixing machines were sup-

plied by the Standard Sand & Machine Co., Cleveland.

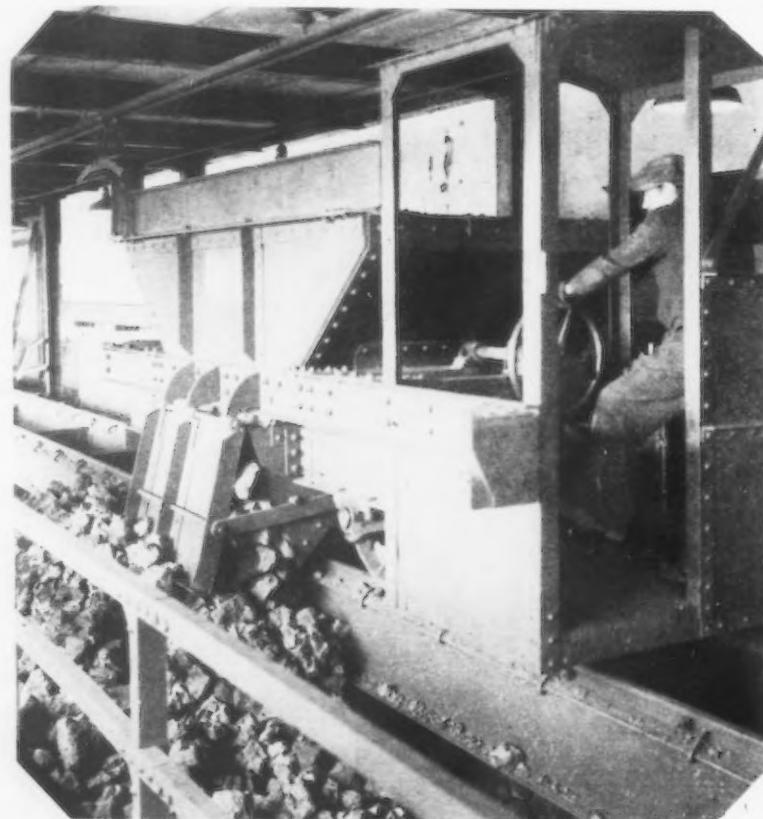
Creep of Low-Carbon Boiler Steels

CREEP experiments on 0.10 and 0.17 per cent steel have been made at the British National Physical Laboratory. In these tests nickel-plated tension pieces were loaded with a constant quiescent mass, and the amount of extension observed at intervals for several weeks.

Curves, where extension is plotted against time, are of two general types. In one, the extension rapidly subsides, and after a few days no further stretching occurs, or perhaps at a very small rate. These temperature and stress limits, below which a steel pressure vessel would be entirely stable (except for corrosion), are as follows:

0.17 Carbon Steel		0.10 Carbon Steel	
Temperature, Deg. C.	Stress, Lb. per Sq. In.	Temperature, Deg. C.	Stress, Lb. per Sq. In.
515	8,700	500	7,850
545	5,600	525	5,400
615	2,240	570	2,240

The initial stretching at loads at and below these limits apparently work hardens the metal, and raises the elastic limit above the limiting stress, whereupon the elongation stops. (When creep ceases, the material is elastic up to the applied stress.) However, when the work hardening is not sufficient to counterbalance the softening due to temperature, any initial creep would be continuous as long as the load is applied or until fracture results.



LARRY Car Loaded by an Automatic Skip, Delivering Coke to a Bin Back of the Cupolas

Light Alloys for Aircraft

Aluminum, Magnesium and Beryllium Are the Principal Metals—Research Constantly Discovering Desirable New Combinations



AIRCRAFT manufacturers have been making wonderful strides in building better and safer as well as larger airplanes and an important aid in this development work is being rendered by the manufacturers of the aluminum alloys used in airplane construction. That there is a constant striving for greater strength and lightness in metals used in airplane construction was brought out in papers presented at an aeronautical meeting held jointly by the Society of Automotive Engineers and the Aeronautical Chamber of Commerce of America at the Hotel Statler, in Cleveland, last week in connection with the annual air races.

Several technical sessions were held, the one Wednesday being devoted to light alloys. This was presided over by Carl B. Fritsche, president of the Aircraft Development Corporation, Detroit, which recently completed the all-metal dirigible ZMC-2 for the Navy Department, described in THE IRON AGE, Aug. 22. Mr. Fritsche remarked at the opening of the meeting that there is a definite trend toward all-metal construction in the aircraft industry.

Wide Variety of Aluminum Alloys Used

ALUMINUM and magnesium, being the lightest commercial metals, are the most suitable for use in aircraft construction, declared E. H. Dix, Jr., metallurgist, Aluminum Co. of America, New Kensington, Pa. Unalloyed, these metals are soft and weak, so that their application is limited. Sheets of 99 per cent aluminum can be hardened by cold working so that they are strong enough for cowling and gasoline tanks. The addition of 1½ per cent of manganese increases the strength and hardness of this alloy. In sheet form it is now used extensively for cooking utensils, and should, because of its corrosive resistance, sooner or later find useful application in the aircraft industry.

Heat treated aluminum alloys are of the greatest importance to aircraft construction, as they possess mechanical properties comparable with those of structural steel. However, because the modulus of elasticity of aluminum and its alloys is practically one-third that of steel, it is necessary to use somewhat thicker sections than would be dictated if relative tensile strengths alone were considered. For this reason aluminum sections are usually about one-half the weight of steel.

Most aluminum castings produced in this country have copper as the principal alloying constituent, and aluminum-copper alloys containing 4 per cent of copper form the base of the most important heat treatable alloys. Duralumin contains 3½ to 4 per cent copper and ½ per cent each of manganese and magnesium. Silicon is used extensively as an alloying element for casting alloys. Nickel is being used to an increasing extent in metal for pistons and cylinder heads. Physical properties of these alloys are given in the table.

Magnesium Alloy Castings Are Heat Treated

IN the magnesium base alloys, aluminum and manganese are the most important alloying elements. Aluminum is used up to 12 per cent and produces alloys that are susceptible to heat treatment. One of the most useful magnesium alloys contains 7 per cent of aluminum and 0.4 per cent of manganese. As sand cast and heat treated this alloy shows a tensile strength of 29,000 to 38,000 lb. per sq. in. and an elongation of 10 to 6 per cent. It is used for starter and pump housings, gearcases and covers, motor cover plates, intake manifolds and sections of crankcases. These parts usually are heat treated if additional strength is required. For rolled sheet, plate, or bar, pure magnesium or an alloy containing 4 per cent of aluminum and 0.4 per cent of manganese is used. The magnesium alloys mentioned, as now made, are stable under atmos-

TABLE I—PROPERTIES OF THE PRINCIPAL ALUMINUM ALLOYS

Alloy Designation	Nominal Composition						Mechanical Properties			Comparative Corrosion Rating ^f
	Cu	Fe	Si	Mg	Mn	Al	Tensile Strength, Lb. per Sq. In.	Yield Point, Lb. per Sq. In.	Elongation Per Cent in 2 In.	
280 ^a	...	...	...	...	...	99	{ 12,000 to 16,000 22,000 to 30,000	.....	30-45 4-1	A A
28H ^b	...	...	...	...	...	97	{ 15,000 to 18,600 27,000 to 35,000	.....	15-30 4-1	A A
380 ^a	...	...	...	...	...	97	{ 15,000 to 18,600 27,000 to 35,000	.....	15-30 4-1	A A
38H ^b	...	...	...	...	...	97	{ 15,000 to 18,600 27,000 to 35,000	.....	15-30 4-1	A A
17ST ^c	4.0	...	...	0.5	0.5	92	{ 55,000 to 63,000 50,000 to 58,000	30,000 to 40,000 27,000 to 36,000	18-25 18-25	C A
Alclad 17ST ^c	4.0	...	...	0.5	0.5	92	{ 55,000 to 63,000 50,000 to 58,000	27,000 to 36,000	18-25	A
A 17ST ^c	2.5	...	...	0.3	...	95	{ 35,000 to 45,000	15,000 to 20,000	20-28	C
B 17ST ^c	3.5	...	...	0.3	...	94	{ 42,000 to 50,000	20,000 to 25,000	20-28	C
25SW ^d	...	...	...	...	...	92	{ 45,000 to 53,000 55,000 to 63,000	15,000 to 30,000 30,000 to 40,000	15-22 16-25	C E
25ST ^e	4.5	...	0.8	...	0.8	92	{ 45,000 to 53,000 55,000 to 63,000	15,000 to 30,000 30,000 to 40,000	15-22 16-25	C E
51SW ^d	...	...	1.0	0.6	...	96	{ 30,000 to 40,000 45,000 to 50,000	15,000 to 20,000 30,000 to 40,000	20-30 16-18	B E
51ST ^e	...	...	1.0	0.6	...	96	{ 30,000 to 40,000 45,000 to 50,000	15,000 to 20,000 30,000 to 40,000	20-30 16-18	B E
C17SW ^d	...	...	1.25	0.5	0.5	92	{ 55,000 to 63,000	30,000 to 40,000	18-25	D
C17ST ^e	4.0	...	1.25	0.5	0.5	92	{ 63,000 to 70,000	50,000 to 55,000	8-14	E
195 ^f	4.5	...	...	...	...	93	{ 28,000 to 50,000	13,500 to 27,000	12-0	C

^a Soft annealed wrought material.

^b Hard-rolled material.

^c Quenched and naturally aged.

^d Quenched.

^e Quenched and artificially aged.

^f A indicates highest corrosion resistance.

^g Refers to castings only; properties vary with heat-treatment.

pheric conditions and no defects from corrosion have been reported.

Mr. Dix discussed at some length the corrosion of aluminum alloys, which the author said has been a greatly over-emphasized subject. He pointed out that corrosion is always an important problem in the aircraft industry, because, owing to the lightness of planes, a slight deterioration by corrosion might result in structural failures. Because of the greatly accelerated conditions under which laboratory tests are made it is dangerous to interpret these tests in the terms of service conditions. In the method now generally used standard tensile specimens are exposed to a corrosive condition and a tensile test is made on these samples after different periods of exposure. The tensile strength and elongation thus observed are compared with the same properties obtained from similar samples that have not been subjected to corrosive influences.

Three Types of Corrosion

THE speaker pointed out that corrosion of metals may occur in general in three ways. There may be a uniform solution of the surface, which moderately decreases the tensile strength. This type of corrosion need not be greatly feared, as its extent can be determined by visual inspection. The pitting type of corrosion is more serious, as this causes a decrease in the ductility as well as in the tensile strength. The third type, inter-granular corrosion, proceeds along grain boundaries and therefore considerable corrosion may occur, although only a small amount of it may be visible. This corrosion causes a decrease in tensile strength with a marked reduction in elongation.

Artificial aging of certain of the heat treatable aluminum alloys at an elevated temperature to produce maximum strength in hardness causes a marked decrease in corrosion resistance. For this reason the artificial aging of thin sheets of alloys for aircraft construction is not recommended.

The speaker discussed some of the qualities of Alclad, which is a corrosion resistant aluminum sheet. This is produced by covering the strong aluminum alloy core with thin layers of extremely pure aluminum. The high purity aluminum on the surface not only protects the alloy from corrosion by acting as a covering, but also exerts an electrolytic protection over any exposed areas of the underlying alloy, as at the sheared edges of the sheet or in abraded areas.

Methods of painting aluminum alloys as a protection against corrosion have been developed which are proving very satisfactory in commercial use. While sand blasting and other methods of cleaning before painting have been used, Mr. Dix stated it is now generally believed that cleaning with certain mild chemical cleaners which remove the grease without attacking the metal is the most satisfactory method.

During a discussion of the paper, Mr. Dix expressed the opinion that the electric furnace will ultimately be used for heat treating some of the strong aluminum alloys that are now usually heat treated in a bath of fused sodium nitrate, because of the necessity of having close temperature control.

Forging Alloys of Aluminum

MODERN light alloys and their application to aircraft engine design were discussed in a paper by G. D. Welty, engineer, Aluminum Co. of America, Cleveland. He pointed out that there are properties in metal for some uses that exceed in importance the properties of strength and lightness. One of these is the property of thermal conductivity.

There are three strong wrought alloys in common use in the aircraft industry today. One known as 17-S is used mostly in the form of sheet, tubing and extruded shapes for such parts as frame work and wing coverings.

For the latter purpose the sheet is usually given a coating of high purity aluminum (Alclad).

The two other commonly used alloys, 25-S and 51-S (Table I), are better suited for making forgings, and are used extensively in aircraft engines. 25-S, heat treated and aged, has high tensile strength and a Brinell hardness of 110. This combination of properties makes it suitable for use in highly stressed parts such as propeller blades, connecting rods for in-line engines and link rods for radial engines. This alloy can also be used as a bearing material running directly against the journal.

Alloy 51-S, heat treated and aged, is lower in ultimate strength than 25-S, but is practically its equivalent in yield point and hardness. Forgings can be made from this alloy which would be difficult, if not impossible, to make from the harder alloys. Mr. Welty said that it is widely used for such parts as crankcases and nose sections for radial engines.

Selecting the Proper Alloy Casting

IT was pointed out that selecting the most suitable alloys for aircraft engine castings often presents a more complicated problem than in the case of forgings, because such questions as production in permanent molds, strength at high temperatures, bearing characteristics, thermal conductivity and cost are frequently important factors. The old reliable alloy, No. 12 (containing 8 per cent copper and the balance commercially pure virgin aluminum), is used in large quantities by the automotive industry for engines up to 400 hp. of the in-line or the V type. However, in radial engines and in large V-type engines, where efforts are being made to reduce weight, the modern heat treated casting alloys of aluminum or magnesium have displaced No. 12 for major parts. Mr. Welty made a comparison of properties of the two alloys to emphasize the advance that has been made through the development of heat treated compositions. The tensile strength of sand cast alloy No. 195 is about 50 per cent more than No. 12, and the elongation is more than four times as much. A $\frac{1}{2}$ -in. sand-cast test specimen of No. 195 can be bent through an angle of more than 90 deg. before fracture occurs. This was unheard of in cast alloys a few years ago. He also referred to the lower density of the No. 195 alloy, which is of importance because of the saving in weight.

Tough Alloys Cut with Tungsten Carbide Tools

THE author mentioned an aluminum piston alloy developed during the past few years, which he said is beginning to have commercial application. The advantages of this piston alloy consist chiefly in a lower coefficient of expansion and the lower specific gravity. This alloy, he said, is difficult to cut, but with the cemented tungsten carbide tools now available it can be readily machined.

Discussing the place of magnesium in the aircraft industry, the author recommended careful tests before adopting magnesium alloys for major structural castings. Through long intensive research work, magnesium products can now be made that are harder and far more resistant to corrosion than formerly produced. As a result the magnesium industry is now emerging from an experimental stage to a sound commercial basis.

Possibilities of the Light Metal Beryllium

THE new metal beryllium was discussed by C. B. Sawyer, Brush Laboratories, Cleveland. This metallic element somewhat resembles both magnesium and aluminum. Its density is about the same as magnesium and its strength is high, being comparable to that of steel and its modulus of elasticity is about the same as steel. Its coefficient of thermal expansion and its melting point are

(Concluded on page 646)

Welded-Steel Overhead Drive Gap-Type Shear

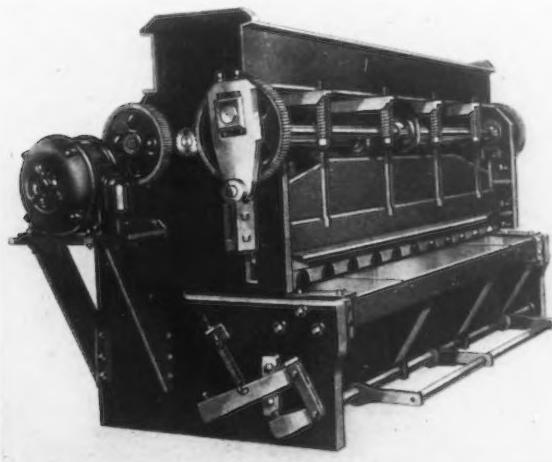
A overhead drive gap-type squaring shear having a non-deflecting welded plate steel frame has been added to the line of the Dreis & Krump Mfg. Co., 7430 Loomis Street, Chicago.

Timken roller bearings are provided on the flywheel shaft and the

lowering the upper knife bar. This adjustment is necessary in changing from shearing sheets requiring only one stroke of the upper knife bar to the shearing of sheets requiring more than one stroke, and vice versa. It is stated that in shearing a sheet requiring just one stroke, the blades

construction of the bearing housing and its mounting is such that they may be rotated through 90 degrees without disconnecting or breaking any electrical joint. The same simplicity of roller mounting is used on the lower horn, and this horn, as well as the roller shaft, is water cooled.

The machine is designed for use on either cylindrical steel or iron, up to No. 14 gage. It is built by the Thomson Electric Welding Co., Lynn, Mass., and can be furnished with a transformer rated at 100, 150 or 175 kva.



THE Gap Shear Has
Direct - Connected
Motor Drive and Easily
Adjustable Connecting
Bar

"super" hold-down employed is intended to provide uniform pressure on the metal before and during the cutting operation. Lubrication is centralized and, as in the company's underdrive weld-steel squaring shears, sheet steel guards are provided at both ends as well as front and rear.

A feature is the simple adjustment in the connecting bars for raising and

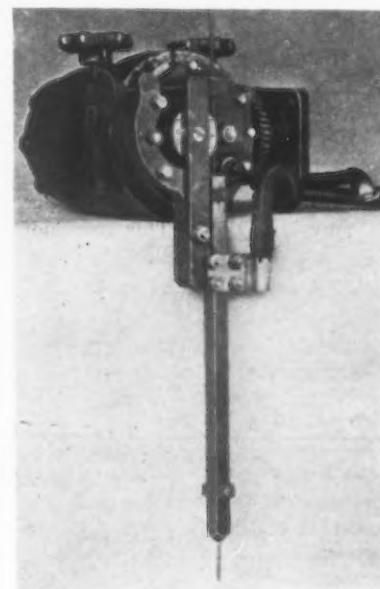
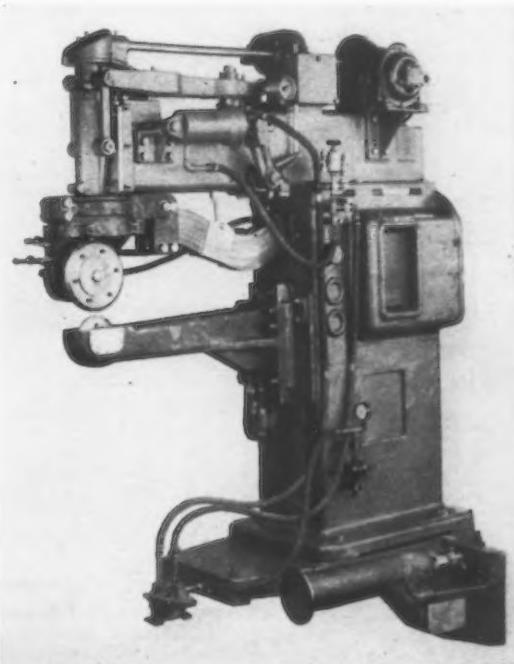
should pass one another at the finishing point, while in shearing a sheet requiring more than one stroke, the blades should meet within the thickness of the material being sheared at the finishing point. Adjustment is quickly made by turning the adjusting screws in the connecting bars up or down, as required. Standard gaps are 18 and 24 in., but special gaps can be furnished.

Heavy-Duty Double-Roller Seam Welder

A HEAVY-DUTY double-roller 30-in. throat seam welder incorporating improved methods of mounting and cooling of upper and lower roller electrode is illustrated herewith.

Drive of the upper roller electrode is through motor, speed - reduction unit and gearing, including change gears for altering the speed of the upper roller. Pressure on the work or the electrodes is obtained by means of an air cylinder that operates through an adjustable spring. Turning on and off of the welding current is controlled automatically through pressure cylinder. The initial air-line pressure to the cylinder may be varied through an adjustable relief valve, the pressure cylinder being controlled by means of a foot valve. The upper roller, which is of offset or open-side type, can be quickly replaced. The roller is a copper forging and is

mounted on the large hub of shaft which is made of durable material. This shaft, as well as the bearing housing, is water cooled, and the con-



The Weldomatic Strikes the Arc Between Electrode and the Work Without the Aid of an Operator

Pittsburgh, Pa. It is designed to operate from either variable or constant-voltage welding motor-generator sets and to meet a demand for an automatic welder of compact dimensions to facilitate mounting on the welding tools, as well as a device that is as reliable as the usual shop tool. It automatically strikes and holds an arc between an electrode and the work to be welded without the aid of an operator, except for pressing the starting button.

The feeding device permits its ready application to work handling tools. The drive motor is mounted in a cylindrical frame which supports the nozzle assembly. The nozzle has adjustments for being moved in two planes, and the assembly can be easily changed for either right hand or left hand work.

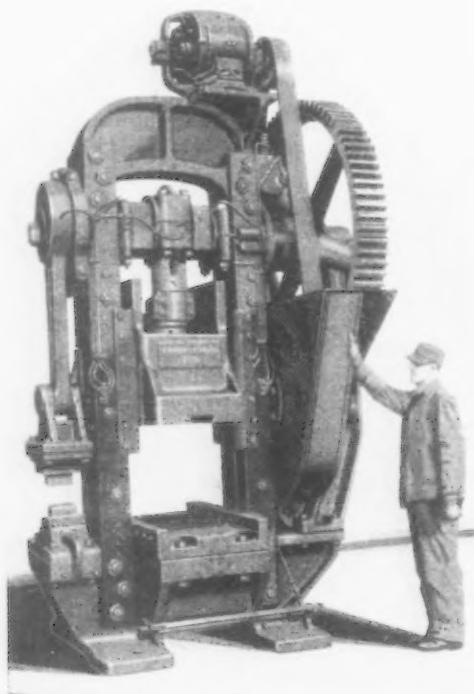
For the tractor plant to be built for the Soviet Government at Stalingrad, Albert Kahn, Detroit, is architect and the Truscon Steel Co., Youngstown, Ohio, will supply the building materials.

Press With Forged Steel Side Frames

A NEW straight-sided trimming press featuring forged steel side frames and friction slip flywheel has been brought out by Chambersburg Engineering Co., Chambersburg, Pa.

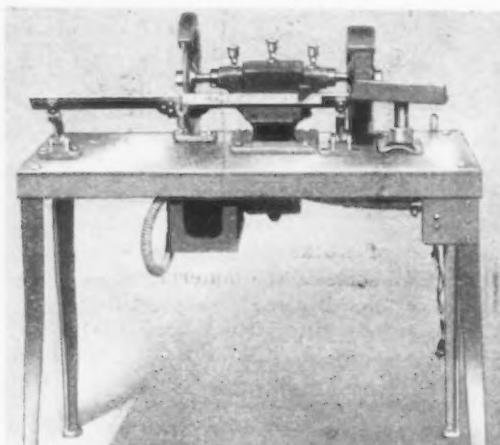
The forged steel side frames minimize breakage and the friction slip

tically eliminated. Before shipment each press is given an "overload-stall" test. Each machine must retain proper alignment when the ram is stalled at full speed near the bottom of its stroke, and must function satisfactorily after the test without



(Left) The Forged-Steel Side Frames Minimize Breakage and the Friction Slip Flywheel Guards Against Overloading

(Right) Core Cutting-Off and Coning Machine Equipped with Motor Drive to Increase Output



flywheel is intended to guard against overloading, stalling and breaking. Adjustment of the frictions is rarely necessary after slipping, and therefore lost time from this cause is prac-

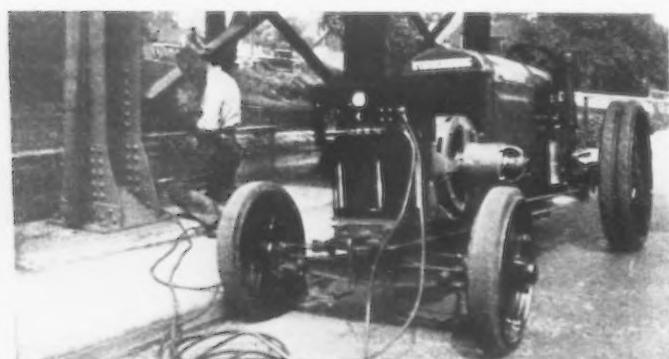
adjustment. All shafts are on one side of the press and the driveshaft is mounted in roller bearings. The machine is furnished with or without the sprue cutter.

Tractor-Mounted Arc Welder

A N arc welding unit consisting of a Lincoln stable arc welder mounted on a McCormick-Deering tractor is being built by the Pontiac Tractor Co., Pontiac, Mich. It is furnished either with a 200 or a 300-ampere machine, and is intended for utility work of wide range.

The extension frame in this mounting is such that the tractor is simply set into a 4 in. I-beam frame and the front axle assembly is set ahead un-

der the frame, thereby lengthening the wheelbase. This construction is intended to reinforce the tractor and give it balance, making it easy to steer with the added weight. The welder unit complete with the panel is mounted on this frame member ahead of the tractor and is driven by belt from the power pulley at the side of the tractor. Dual 48 x 4-in. tires are used in the rear. The road speed of the machine is 15 miles an hour.



With a Road Speed of 15 Miles an Hour, the Tractor-Mounted Welder Is Adapted for Utility Work of Wide Range

New Core Making Equipment

A CORE cutting-off and coning machine and a new core making machine, both motor driven, have been placed on the market by the Wadsworth Core Machine & Equipment Co., Akron, Ohio.

The cutting-off and coning machine, illustrated herewith, is of $\frac{3}{8}$ in. to $2\frac{1}{4}$ -in. capacity and is driven by a $\frac{1}{4}$ -hp., 110-volt, alternating current motor that takes current from a light or power circuit. The motor is controlled by a push-button switch located at the operator's right hand. All working parts of the machine, including the cutting-off and coning wheels, are completely guarded. The

swinging rest for holding the core while being cut off has a graduated scale and a movable stop that can be adjusted to give various lengths of cores, and an adjustable core rest for the coning wheel permits the operator to make any desired taper or cone on the end of the core.

Designated as the No. 1 and similar to the previous model, the new motor-driven core making machine uses the same dies, conveyor screws and other accessories of the former machine. The capacity is from $\frac{3}{8}$ in. to 3 in. It is driven by a $\frac{1}{4}$ -hp. 110-220 volt direct connected motor that takes current from the lighting circuit, and is equipped with a simple safety clutch that is intended to protect both the gears and the motor. The machine is stopped and started by means of push-button switch. All parts of the machine are accessible and ample lubrication is provided. The motor-driven machine provides for higher output than the hand-operated unit.

Wire enameling machines formerly built by the Strand Enamel Works, Winsted, Conn., will be manufactured and marketed exclusively by Sleeper & Hartley, Inc., Worcester, Mass. The Strand company will continue the manufacture and sale of enameling materials.

Midwest Air Filters, Inc., Bradford, Pa., has moved its New York district sales office from East Forty-fifth Street to 347 Madison Avenue.

This Issue in Brief

Riveted test boiler drum of manganese steel fails in head in fatigue tests. After 45,000 cycles of pressure at 50 per cent above working stress, slight leaks appear in head seams.—Page 610.

* * *

Disassembles airplane engines after 5-hr. test run. Parts are then washed and inspected, engine is reassembled and given final test.—Page 597.

* * *

Congestion due to conveyor tie-ups or "slow-downs" is avoided by use of trucks and trailers, which take some of the material off the mechanical conveyors and deliver it to its destination.—Page 594.

* * *

Automobile plant maintains a separate conveying department with a central office. The routing man enters on a special chart all calls for special movements of materials, turning the calls over to operators whose schedules are light at the moment.—Page 594.

* * *

Steel is not attacked if pickling is done properly, tests reveal. When steel rods are cleaned in dilute acid, the oxide scale first succumbs; after the metal is laid bare the steel begins to corrode.—Page 598.

* * *

Fatigue of steel caused airplane disaster. Examination of fractured bearing stud in engine of destroyed British plane reveals no heat discoloration.—Page 600.

* * *

Strength of welded boiler seams under repeated cycles of pressure is greatly affected by variations in welding practice, tests reveal. Necessity for developing good, uniform welding practice, plus careful inspection, is indicated, says engineer.—Page 611.

Welded joints in test drum shells have been developed which withstood cycles of stress varying from zero to a value 50 per cent above the allowable working stress for more than 400,000 cycles. This is at least 50 times as many cycles as would be developed in the normal life of a boiler.—Page 611.

* * *

Pitting type of corrosion is more to be feared than surface corrosion, for the former causes a decrease in ductility as well as in tensile strength of aluminum alloys. The third type, intergranular corrosion, proceeds along grain boundaries, and, although only a small amount may be visible, considerable corrosion may occur.—Page 616.

* * *

New August pig iron production record established with average daily output of 121,151 tons, which was $\frac{3}{4}$ per cent below July daily rate. On Sept. 1 there were 210 furnaces in blast, a net loss of 6 for the month.—Page 624.

* * *

Saves 60 per cent of cost of handling refuse materials. Purchase of gasoline tractor, side-dump wagons and chutes more than halves the expense of waste removal, compared with cost of having work done by an outside hauling company.—Page 594.

* * *

Stamping department costs sharply cut by using electric lift trucks for changing heavy dies. Labor expense of eight men is saved.—Page 596.

* * *

Artificial aging of aluminum alloy sheets for aircraft construction is not recommended. Though maximum strength and hardness are attained, corrosion resistance is reduced.—Page 616.

Reduces forging plant costs by using power loader to dump small forgings into cleaning barrels. Loaded skid is placed on loader by a truck and the skid and its contents are raised and dumped directly into tumbling barrel.—Page 601.

* * *

Breaks in drawing dies will result from ineffectiveness of the lubricant if occluded hydrogen is left in the stock after the pickling operation. Rough, embrittled surfaces offer ample secretion for the hydrogen.—Page 598.

* * *

Tapped hole in boiler shell under pressure fatigue test proves weaker than welds. Tests suggest incorrectness of theory that a hole causes a stress-intensification at its edge amounting to three times the computed stress in the plate.—Page 609.

* * *

Scrap-conveying belt carries forging flashings from trimming presses direct to dump-body skid. Skid is then emptied into a baling press.—Page 601.

* * *

Pickling costs can be cut if solution is properly inhibited. Proper use of inhibitors prevents production of harmful hydrogen, and water only is formed.—Page 598.

* * *

Foundry solves problem of smoke and heat in the vicinity of shake-out by performing this operation below the floor. Castings and sand are knocked out through a grating on to an apron conveyor. Gases and smoke are drawn away through a hood above the shake-out.—Page 613.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

ESTABLISHED 1855

Our Machine Tool Prosperity

AS with steel, the demand for machine tools this year has far outstripped all expectations. The traditional summer slump has not come. In June the National Machine Tool Builders' Association observed that "activity is not likely to continue at the present level"; yet in spite of the absence of many purchasing executives on vacations and the letdown in the automobile industry, July and August brought only a moderate recession in machine tool buying. Many companies have unfilled orders on their books in substantially as large a volume as at the beginning of the summer. Some lines are so well sold up that the best possible deliveries now offered extend into the first quarter of 1930.

Such a situation the machine tool industry has not known since the war. Even during the exceptionally prosperous 1919-1920 period the manufacturers were constantly menaced by the thousands of used tools still in process of liquidation after the war.

Present conditions bear no resemblance to a boom. There has been no enormous expansion of metal-working plants, such as occurred during the war, to account for a demand in excess of output. Some large lots of tools have been bought, but in the main the industry has received the bulk of its orders in units of one to half a dozen machines from widely diversified lines of manufacture.

Progress in design has brought into use tools which in output and reduction of operator attendance have so far surpassed those of ten years ago that manufacturers who would keep their costs on a level with their competitors' have been forced to adopt the newer equipment.

Companies which install machines of greater productive efficiency are not always able to keep their competitors from knowing the cost reductions achieved. Competition is such today that the improved process of one manufacturer soon becomes the practice of the more progressive of his rivals.

Machine tool builders who are trying to scan the future believe that another era of rehabilitation of machine tool equipment in American manufacturing plants is really just beginning. Perhaps no single current development is of more widespread interest than the experiments with tungsten carbide cutting tools, with their promise of the extension of machine shop work into hitherto unoccupied fields.

Apparently most users of machine tools are not waiting for the full fruition of prospective machine

tool changes, but are availing themselves of the best of current models, so that no time may be lost in putting their shop costs on the lowest possible basis. Only a minimum of postponed buying has resulted from the fact that in another month an unusual array of the products of machine tool design, including many tools not shown before, will be seen at the National Machine Tool Exposition in Cleveland.

Scrap Supply Has Not Failed

IN 1906, when Bessemer steel output was at its maximum and the steel ingot figures showed 54½ per cent Bessemer and 45½ per cent open-hearth, no one would have believed that if in 1929 we were to make 87½ per cent open-hearth and only 12½ per cent Bessemer there would be enough scrap to go around. The prediction would have been made with confidence that a much larger percentage of pig iron and a much smaller percentage of scrap would have to be used, the point being that substantially all the scrap made in rolling Bessemer steel is available for open-hearth use.

Yet the fact is that in 1906 the total production of basic pig iron was 52 per cent of the total production of basic open-hearth steel ingots and castings, while in the first half of this year the proportion was approximately 53½ per cent, showing an almost negligible rise of 1½ points.

Various influences have been at work to offset and preserve a good supply of scrap for open-hearth steel making. First, the proportion of works scrap to ingot production has increased. In 1906 rolled steel production was 76.9 per cent of ingot production, while in 1928 the proportion was down to 73.9 per cent. Second, 2,186,557 tons of rolled iron was produced in 1906, chiefly from scrap, but in 1928 only 484,977 tons. There was not merely a failure to keep pace with the general increase in scrap supply, but the actual release of more than a million tons of scrap. Third, the foundry industry has failed to keep pace, if, indeed, it has not decreased its scrap consumption. Fourth, in the consumption or working up of steel there is a larger percentage of scrap produced, due in chief to the more intricate operations performed. The automobile industry is a very large producer of scrap relative to its steel purchases.

The four trends mentioned are readily observed. Two additional trends will be admitted, although

they cannot be measured. In the first place, the layer of steel spread over the country has become denser or thicker, and thus it is easier than formerly to gather old material. Possibly there is a partial offset to this in the smallness to which we now reduce some steel, to the tin can, for instance. Second, things move faster nowadays and in many cases scrap comes back sooner. The increase in weight of railroad rolling stock and the advent of the automobile have necessitated greater replacement of bridges than in the old days. Buildings now being torn down contain much more steel than those torn down in 1906.

The future is another matter. Several of the trends mentioned will not continue to help the scrap supply. Pig iron may come into its own. Production of sound ingots at a cost competitive with the convenient method of cropping to get sound steel would make a great difference.

Building Up Industry in Russia

OFFICIAL reports and statements of unofficial observers unite in declaring that the manufacturing industries in Russia are generally producing at a higher rate than prior to 1914. Russia always has been a nation of peasant farmers, and even yet the per capita consumption of such things as electricity, sewing machines and even agricultural machinery is very low.

As is well known, during the revolution production was almost at a standstill. After some disastrous experiments in over-centralization, the Soviet Government has reverted lately to a workable economic policy in the form of various industrial trusts, each responsible for the small details of production, and subject to control of the state only on such questions as policy, labor management and volume of production. New projects are being financed by the central government as rapidly as the balance of trade and foreign credit permits. Apportionment of funds is made according to a five-year budget which contemplates, among other things, the trebling of pig iron production and doubling the output of rolled steel by 1933.

One traveler, who has written for the *Iron and Steel Industry* (London), was particularly struck with the Leningrad Metal Factory, typical of the new plants being erected. "Imagine, if you can," he writes, "a boiler factory built by a philanthropic millionaire, solely with a view to the health, comfort and cleanliness of the workers. A place of light and spaciousness. Windows, beautifully designed, occupied almost the entire breadth and depth of the two ends of the first shop one entered. They are wide and lofty like the windows of a cathedral. The gangways are wide. Floorings are clean and smooth. Machinery was active and efficient. There was no sign of idleness or indiscipline."

The British observer was of the opinion that overhead charges were entirely disregarded in this plant. That does not exactly follow. While we in America have not yet reached the plane of putting cathedral windows into boiler shops, we have discovered that a wall made of glass is quite frequently

cheaper than a wall of brick when everything is taken into consideration. In other words, American industry has long recognized that what might appear to be wasteful expenditures for the employees—like physical examinations, medical dispensary service and care of health, sanitary latrines and drinking fountains, rest periods, special light and even artificial weather, spacious working places, parked grounds, clean, well painted shops, elimination of noise, heat, smoke and dust—all these things make for better efficiency in the workman, lower labor turnover and a lowered manufacturing cost for a superior article.

A modern Russian factory is not to be criticized, therefore, for its spaciousness, cleanliness and ornamentation. The Soviets are getting the best kind of tools, but unfortunately, do not know yet how to use them. The result is that a Diesel engine which could be bought in Germany for \$2,000 costs them \$3,500 to build at home, even though the Soviet Government has built the factory (and capital costs are zero), though the industrial trusts have a monopoly (and selling costs are at a minimum) and though the state theoretically regulates the cost of living and the labor cost.

Research and Human Satisfactions

"WERE it not for the very great improvements in electric power and electric lighting which have been made by the industrial scientists during the past 25 years," writes John J. Carty, vice-president American Telephone & Telegraph Co., "the bill which the public is now paying for electric current would be greater by more than two billion dollars a year."

Without wishing to dispute the argument about the value of industrial research, we think that General Carty reaches his objective from the wrong direction. If these many improvements had not been made, the public would not be using nearly so much power as it does today. The advantage of research is not primarily that profits are enlarged, or that selling prices are reduced; it is that the utility is increased. More and more electricity is used by more and more people, with a tremendous increase in human satisfactions.

That is the achievement of research in all the industries.

Steel Extras Holding

BETTER merchandising methods in steel came strongly to the front in trade discussions late in 1927. Lately the matter has had little prominence, as heavy demand has made the flow of orders quite smooth. There is one phase of this general subject that deserves attention now as much as at any other time, for it encourages effort to make further improvement, and that is the matter of extras, differentials, etc. What steel sellers have done in the last few years by way of revising their lists and rules, and of adhering to them, is remarkable when we think of the violations in earlier years and the indisposition of sellers

to make changes when such changes were clearly dictated by considerations of cost and other factors.

In the last three years there have been many changes and improvements of this sort, more than anyone is likely to recall off-hand. In not a few cases there was opposition as well as a doubt whether sellers would really adhere to the new rules laid down, but in every instance so far as known the new practices came into vogue with little difficulty.

No doubt there has been a gradual change in the mental attitude of buyers which helped to put these reforms into effect. Cost accounting has been vastly improved and the average buyer, when the mill tells him it costs so much to fill this or that specification, realizes that the mill knows what it is talking about; that there is no effort to squeeze out an extra profit on the particular sizes or forms of material involved. The steel consumer has his own experiences in cost accounting and is ready to admit that the steel producer is in the same position.

Just three years ago the sheet steel industry made a sweeping change in its gage differentials on black and galvanized sheets. For many years 28 gage had been base, and costs had become such that the established differentials were not in keeping. The differential, for instance, between 28 gage and 24 gage was less than the difference in cost, and accordingly there was shading of the 28 gage base price when the specification involved 24 gage. The change consisted in making 24 gage the base, instead of 28, and gage differentials were revised so as to give a wider spread between 24 and 28, in keeping with costs. Some buyers had doubts whether mills would promptly and fully adhere to the new system, but there was no trouble. Later the sheet mills reduced the cash discount from 2 per cent to $\frac{1}{2}$ per cent and there was much complaint, chiefly by jobbers, but the change was made.

There was a card on wire nails which was not in keeping with latter day costs. As of Dec. 1, 1927, the nail manufacturers adopted a new card in line with the conditions. There was criticism and a little doubt whether the new card would be followed, but the whole matter has passed into history.

Various other revisions could be listed. It is sufficient to point out that in the last few years steel makers have been able to put their prices into closer alignment with costs and to effect these reforms with an acquiescence on the part of buyers which would not have been expected in the old days. This encourages the making of such further changes as may be suggested by costs and sales conditions.

Pure Iron

A RECENT technical paper by T. D. Yensen of the research department of the Westinghouse Electric & Manufacturing Co. draws our attention to the fact that at present science and technology know no such thing as pure iron. Purity is, of course, an indefinite term in respect to anything short of the absolute and may always remain so. However, we gradually increase in refinement. We used to speak of substances as being pure when perhaps they were rather far from being so. A distinction might then

be made as to the same substance produced in small quantity for laboratory use by characterizing it as "chemically pure," and the conventional abbreviation c.p. still remains a part of our technical vernacular. Some commodities now regularly produced are superior in refinement to the old c.p. grades. In small quantities the ability of ordinary, or even extraordinary, chemical analysis is surpassed and we have to coin a new phraseology and speak of a substance as being spectroscopically pure.

According to Mr. Yensen, the highest grade of iron that has been commercially available is one guaranteed to contain 99.85 per cent Fe. That is considerably short of the grade of first-class commercial copper, lead and zinc. What is called "high-grade" zinc is available in great tonnage with 99.93 to 99.97 per cent Zn. A super-zinc is produced in large tonnage with 99.99 per cent Zn. From the research laboratories come samples of spectroscopically pure metal with 99.9999 per cent Zn.

In its work on iron the Westinghouse laboratory during the past 10 or 15 years has been able to produce metal containing 99.95 per cent Fe. We infer that recently it has been possible to go even higher than that. As has been the experience with other metals, the removal of impurities in terms of the last few hundredths of 1 per cent shows enormous changes in some of the properties of the metal. The most striking things so far observed as regards iron are immense increases in magnetic permeability and much lower hysteresis values. There are indications that pure iron may have a hysteresis loss approaching zero. These are important things for electrical manufacturing.

Of course there are many uses for which pure iron is not wanted. Manifestly steel owes its valuable properties to other elements that are combined with iron. So it is with zinc. Super-zinc finds special uses; but on the other hand some manufacturing is best done with spelter containing a little cadmium, or a little lead, or a little of both. Alloying elements that develop valuable properties obviously are not to be regarded as impurities.

One of the startling things of modern metallurgy has been the powerful effect of the addition (or subtraction) of minute quantities of other metals to an iron, copper, lead or zinc base. And one of the practical developments therefrom has been the increased buying by manufacturers according to specifications. We have traveled a long way from the abracadabrics days when in deference to the ideas of a Welsh foreman metal could be used successfully only if it were cast in a mold with a certain brand; and when smelters kept an assortment of molds with different brands to satisfy the requirements of different Welsh foremen.

A Diesel engined tractor, exhibited at a recent agricultural exhibition in England, has a variable gear in its transmission, so arranged that the speed reduction is automatically adjusted by an infinite number of steps to correspond with the tractive effort at the draw bar, required to pull the load. The engine exhibited had run 100,000 miles without repairs to the transmission.

Appeals for Support of Reserve Board

System to Be Sharply Contested Issue in Congress, Says
Alvan T. Simonds—Results Will Be Far-Reaching

"As we look ahead at industrial and business conditions, perhaps the most important question is whether or not the Federal Reserve Board will be able to control the use of credit and keep at a reasonable point the cost of borrowing money for use in commerce and industry," says Alvan T. Simonds, president, Simonds Saw & Steel Co., Fitchburg, Mass., in the September issue of *Looking Ahead*.

"The Reserve System, when it was adopted, was expected to do this. It was also expected to eliminate bank failures among its member banks. It was also hoped that few banks would find it profitable to remain outside the system. The root of the plan was protection for all who entrusted their money to the banks."

Mr. Simonds says that it is a common duty to support the Government as represented by the Federal Reserve Board. In Great Britain, he declared, the Bank of England is regarded as a part of the nation's defense and Chancellor of the Exchequer Snowden recently called upon other financial institutions, in no uncertain terms, to lend their support to the bank. He asked more of them than the Federal Reserve Board would think of asking for in America.

Referring to current agitation

aimed at the Reserve System, Mr. Simonds added, "We shall do well to watch and study the situation as it develops, for it promises to bring before Congress and the country one of the most perplexing and most sharply contested post-war financial issues. Upon the settlement of this issue may depend industrial, commercial and financial prosperity in the United States for years to come. A new patriotism, perhaps a higher patriotism, is called for, especially on the part of some of those of great financial influence."

Commenting on the current stage of production in this country, Mr. Simonds points out that since 1919 there have been three complete cycles in industrial output in terms of volume (not dollars), as reported by the Federal Reserve *Bulletin*. Each peak has been higher than the preceding one and each has come later in the year than in the preceding cycle. The fourth cycle, now in progress, has thus far been in the ascending stage and it is still uncertain whether, following precedent, the peak will be later than it was in 1926, in the previous cycle. Industrial production, as reported monthly in the Federal Reserve *Bulletin*, does not include output of agriculture or fisheries.

the Simonds economic contest for 1928 on the subject, "Reducing the Costs of Distribution," has been appointed instructor in marketing at the Massachusetts Institute of Technology. According to the authorities of that school, "Mr. Elder came to our attention as the result of his prize-winning essay. We probably never would have known of his talents had it not been for the prize offered by Mr. Simonds."

Connersville and Wilbraham Blower Companies Bought

The Stacey Engineering Co., a new Ohio corporation operating as a holding company, took over the following manufacturing concerns on Aug. 31:

Stacey Brothers Gas Construction Co., Cincinnati; Connersville Blower Co., Connersville, Ind., and Wilbraham-Green Blower Co., Pottstown, Pa.

These companies for a long period of years have been engaged in the construction of gas holders, blowers and other apparatus. The new concern has also a substantial interest in other allied concerns.

The new company is headed by Beman G. Dawes, chairman of the board, Pure Oil Co., and with him are associated Carmi A. Thompson, Cleveland, and F. S. Heath, Columbus. The board of directors includes Wayne Stacey, William A. Miller, John T. Wilkin and Charles A. Ward. Carmi A. Thompson is president, John T. Wilkin, F. S. Heath and Wayne Stacey, vice-presidents; D. H. Mulloney, secretary; Charles A. Ward, treasurer.

The Stacey Brothers company has made a specialty of low-pressure telescopic gas holders. The Connersville company started in a small way in 1893 and manufactures more than 100 different types of blowers, and in addition controls patents on a new type of station meter. The Wilbraham-Green company is one of the oldest companies of its kind in existence.

All three of these companies will be officered by their present organizations. The home offices of the Stacey Engineering Co. for the present will be located in Columbus.

Chrome Ore in Cuba

The owner of a chrome deposit located in the Province of Matanzas, Cuba, is desirous of establishing contact with consumers in the United States. The property is now idle but if a steady market can be located the owner states that delivery to the port of Havana can be commenced within a month. Analysis of the ore shows content of: Cr₂O₃ 43.84 per cent, iron 12.2 per cent, silica 1.05 per cent. The owner of this deposit is seeking a market for the ore, not the sale of the property. Further information will be furnished on direct request to Minerals Division, Bureau of Foreign and Domestic Commerce, Washington.

Federal Reserve Is Subject of Simonds Contest

"The Federal Reserve System and the Control of Credit" is the subject of the Alvan T. Simonds economic contest for 1929. Papers must be submitted by Dec. 31, 1929. Rules may be obtained by writing the contest editor, Simonds Saw & Steel Co., Fitchburg, Mass.

Robert F. Elder, Berlin, N. H., the winner of the first prize of \$1,000 in

New August Record in Iron Output

Daily Rate Less Than July by Only 949 Tons or 0.75 Per Cent—Eight Months' Total 1,213,000 Tons Over Next Largest—Net Loss of Six Furnaces

AUGUST pig iron production established two new records—the largest for that month in history and a new high total for the first eight months of any year.

From returns collected by wire on Tuesday, Sept. 3, the August output was 3,755,680 gross tons or 121,151 tons per day for the 31 days. This compares with 3,785,120 tons for the 31 days in July when the daily rate was 122,100 tons. This is a loss in

daily rate of 949 tons or about 0.75 per cent. The next largest August was 111,274 tons per day in 1923.

New Record for Eight Months

For the eight months ended with August the total production was 29,181,760 tons. The nearest approach to this was the 27,969,000 tons to Sept. 1, 1923—an increase of about 1,213,000 tons, or 4.3 per cent. Compared with the first eight

months' output in 1928 of 24,729,315 tons, the increase this year was 4,453,445 tons, or 18 per cent.

Rate of Operation on Sept. 1

There were 210 furnaces operating on Sept. 1 with an estimated operating rate of 119,130 tons per day. On Aug. 1, there were 216 furnaces active, having an estimated operating rate of 121,965 tons daily. There were nine furnaces shut down dur-

Daily Average Production of Coke Pig Iron in the United States by Months Since Jan. 1, 1925—Gross Tons

	1925	1926	1927	1928	1929
Jan.	108,720	106,974	100,123	92,573	111,044
Feb.	114,791	104,408	105,024	100,004	114,507
Mar.	114,975	111,032	112,366	103,215	119,822
Apr.	108,632	115,004	114,074	106,183	122,087
May	94,542	112,304	109,385	105,931	125,745
June	89,115	107,844	102,988	102,733	123,908
1/2 year	105,039	109,660	107,351	101,763	119,564
July	85,926	103,978	95,199	99,091	122,100
Aug.	87,241	103,241	95,073	101,180	121,151
Sept.	90,873	104,543	92,498	102,077	111,274
Oct.	97,528	107,553	89,810	108,832	111,274
Nov.	100,767	107,590	88,279	110,084	111,274
Dec.	104,853	99,712	86,960	108,705	111,274
Year	99,735	107,043	99,266	103,382	111,274

Pig Iron Production by Districts, Gross Tons

	Aug.	July	June	May
	(31 days)	(31 days)	(30 days)	(31 days)
New York and Mass.	253,889	256,697	246,124	265,512
Lehigh Valley	88,395	95,571	102,302	108,803
Schuylkill Valley	74,871	71,350	70,265	74,312
Lower Susq. and Leba-	37,706	37,775	44,651	33,392
non Valleys	827,285	815,045	787,313	814,944
Pittsburgh district	139,835	144,455	148,675	157,352
Shenango Valley	150,272	146,886	143,474	159,960
Western Pennsylvania	115,804	123,447	117,250	135,073
Maryland, Va. and Ky.	130,296	127,136	133,450	147,933
Wheeling district	368,609	373,181	372,030	380,129
Mahoning Valley	377,604	387,383	374,138	388,958
Southern Ohio	54,842	52,232	46,345	47,635
Illinois and Indiana	773,150	772,276	771,070	795,902
Mich., Minn., Mo., Wis., Colo., Mo. and Utah	147,992	146,304	131,514	145,840
Alabama	205,209	225,513	219,235	235,117
Tennessee	9,921	9,869	9,389	6,620
Total	3,755,680	3,785,120	3,717,225	3,898,082

Coke Furnaces in Blast

Furnaces	Sept. 1		Aug. 1	
	Number in Blast	Gross Tons per Day		Gross Tons per Day
<i>New York:</i>				
Buffalo	14	7,320	14	7,295
Other N. Y. and Mass.	2	595	3	980
New Jersey	0	...	0	...
<i>Pennsylvania:</i>				
Lehigh Valley	7	2,290	8	3,085*
Schuylkill Valley	5	2,415	5	2,300
Susquehanna Valley	2	1,215	2	1,170
Ferromanganese	0	...	0	...
Lebanon Valley	0	...	0	...
Ferromanganese	0	...	0	...
Pittsburgh District	40	25,382	41	26,225
Ferro. and Spiegel	3	540	3	485
Shenango Valley	8	4,510	8	4,370
Western Pennsylvania	8	4,510	7	4,185
Maryland	6	3,220	6	3,345
Wheeling District	7	4,200	7	4,135
<i>Ohio:</i>				
Mahoning Valley	20	12,400	19	12,040
Central and Northern	19	12,000	20	12,495
Southern	4	1,770	4	1,700
Illinois and Indiana	35	24,940	35	24,915
Mich., Wis. and Minn.	6	2,825	7	3,405
Colo., Mo. and Utah	3	1,430	3	1,315
<i>The South:</i>				
Virginia	0	...	0	...
Ferromanganese	1	95	1	90
Kentucky	1	415	1	420
Alabama	14	6,360	17	7,270
Ferromanganese	0	...	0	...
Tennessee	2	315	2	315
Total	210	119,130	216	121,965

*Includes spiegeleisen.

Production of Coke Pig Iron in United States by Months Beginning Jan. 1, 1927—Gross Tons

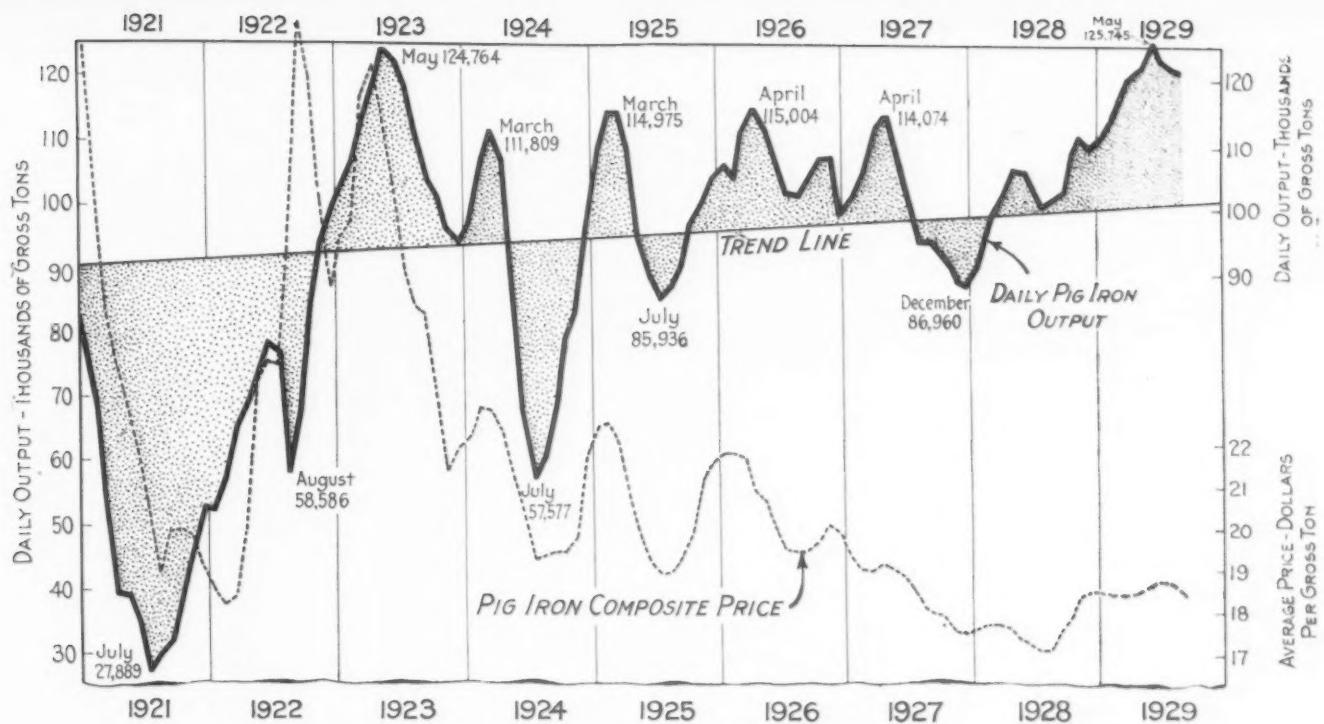
	1927	1928	1929
Jan.	3,103,820	2,869,761	3,442,370
Feb.	2,940,679	2,900,126	3,206,185
Mar.	3,483,362	3,199,674	3,714,473
Apr.	3,422,226	3,185,504	3,662,625
May	3,390,940	3,283,856	3,898,082
June	3,089,651	3,082,000	3,717,225
1/2 year	19,430,678	18,520,921	21,640,960
July	2,951,160	3,071,824	3,785,120
Aug.	2,947,276	3,136,570	3,755,680
8 mos.	25,329,114	24,729,315	29,181,760
Sept.	2,774,949	3,062,314	...
Oct.	2,784,112	3,373,806	...
Nov.	2,648,376	3,302,523	...
Dec.	2,695,755	3,369,846	...
Year*	36,232,306	37,837,804	...

*These totals do not include charcoal pig iron. The 1928 production of this iron was 142,960 gross tons.

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works Iron	Merchant Iron*	Total
August, 1928	82,642	18,538	101,180
September	82,590	19,487	102,077
October	88,051	20,781	108,832
November	88,474	21,610	110,084
December	85,415	23,290	108,705
January, 1929	85,530	25,514	111,044
February	89,246	25,261	114,507
March	95,461	24,361	119,822
April	95,680	26,407	122,087
May	100,174	25,571	125,745
June	99,993	23,915	123,908
July	98,044	24,056	122,100
August	98,900	22,251	121,151

*Includes pig iron made for the market by steel companies.



Production of Pig Iron So Far This Year Has Averaged Slightly Over 120,000 Tons a Day

Inclined line represents the gradually increasing theoretical needs of the country, ascertained by a balancing of the ups and downs in production. It shows an average yearly increase in consumption of about 423,000 tons

ing August and three blown in—a net loss of six furnaces. This compares with a net loss of two furnaces during July.

Independent steel companies did not blow in any furnaces during August but they blew out one. The Steel Corporation blew in two furnaces and shut down four. Four merchant furnaces were blown out in August and only one was blown in. There was therefore a net loss of three steel-making and three merchant furnaces.

Loss in Merchant Iron

The loss in merchant iron during August was 1805 tons per day, the daily rate being 22,251 tons against 24,056 tons in July. In steel-making iron there was a gain of 856 tons per

day, or 98,900 tons per day in August and 98,044 tons per day in July.

Ferromanganese in August

There was 28,461 tons of ferromanganese made in August as against 31,040 tons in July. The August output was the third largest this year. Two companies were making spiegeleisen on Sept. 1.

Furnaces Blown In and Out

Only three furnaces were blown in during August: No. 3 Isabella furnace of the Carnegie Steel Co. in the Pittsburgh district; the Colonial furnace in western Pennsylvania, and the Cherry Valley furnace in the Mahoning Valley.

There were nine furnaces blown out or banked during August: One

furnace of the Witherbee-Sherman Co. at Port Henry, N. Y.; "B" furnace at the Bethlehem plant of the Bethlehem Steel Corporation in eastern Pennsylvania; one Duquesne and one Edgar Thomson furnace of the Carnegie Steel Co. in the Pittsburgh district; one River furnace in northern Ohio; one furnace of the Minnesota Steel Co. in Minnesota; and one Pioneer furnace of the Republic Iron & Steel Co., one Ensley furnace of the Tennessee Coal, Iron & Railroad Co., and the Tuscaloosa furnace in Alabama.

Empire Steel to Increase Open-Hearth Capacity

The Empire Steel Corporation will enlarge its steel-making capacity at Mansfield, Ohio, by the erection of two new 100-ton open-hearth furnaces, making six in all. With the additional melting equipment, this company will make steel for something over 60 per cent of its total requirements. The present open-hearth building will be extended and a new ladle crane, charging machine and other equipment will be added to provide a complete unit.

The group life insurance plan of the General Electric Co. has been revised so that premiums paid by new employees will be in accordance with their age rather than an average rate common to all employees. Plans for free insurance and additional pensions, also equalizing benefits according to age, have been announced.

Production of Steel Companies for Own Use—Gross Tons

	Total Pig Iron			Ferromanganese*		
	Spiegel and Ferromanganese	1927	1928	1929	1927	1928	1929
Jan.	2,343,881	2,155,133	2,651,416	31,844	22,298	28,208
Feb.	2,256,651	2,274,880	2,498,901	24,560	19,320	25,978
Mar.	2,675,417	2,588,158	2,959,295	27,834	27,912	24,978
Apr.	2,637,919	2,555,500	2,826,028	24,735	18,405	22,413
May	2,619,078	2,652,872	3,105,404	28,734	29,940	25,896
June	2,343,409	2,448,905	2,999,798	29,232	32,088	33,363
1/2 year	14,876,355	14,675,448	17,040,842	166,939	149,963	160,836
July	2,163,101	2,464,896	3,039,370	26,394	32,909	31,040
Aug.	2,213,815	2,561,904	3,065,874	21,279	24,583	28,461
8 mos.	19,253,271	19,702,248	23,146,086	214,612	208,455	220,337
Sept.	2,090,200	2,477,695	.....	20,675	22,278	.....
Oct.	2,076,722	2,729,589	.....	17,710	23,939	.....
Nov.	1,938,043	2,654,211	.....	17,851	29,773	.....
Dec.	1,987,652	2,647,863	.....	20,992	28,618	.....
Year	27,345,888	30,211,606	.....	291,840	312,061	.....

*Includes output of merchant furnaces.

Iron and Steel Markets

Decline in Pig Iron Output Is Slight

August Production Only 0.75 Per Cent Below July—Steel Output Shows Little Change, Although Tapering—
Steel Prices Reaffirmed

PIG iron production in August was a record for that month and was the fourth largest output for any month. At 3,755,680 tons, the August total is exceeded only by the figures for July and May, 1929, and May, 1923. The decline from the previous month was only $\frac{3}{4}$ of 1 per cent.

In daily rate of output August ranks sixth with 121,151 tons, being surpassed by the months mentioned and by June, 1923, and June, 1929. The next largest August production was in 1923, when the daily average was 111,274 tons.

Pig iron output thus far this year, at 29,181,760 tons, has established a new eight months' record, forging ahead of the previous high mark, for the corresponding period in 1923, by 4.3 per cent.

A further tapering of output in September is indicated by a net loss of six active furnaces and a daily operating rate of 119,130 tons on Sept. 1, compared with 121,965 tons for the 216 stacks in blast Aug. 1.

The trend of steel ingot production in September also appears to be downward. Although no marked recession is looked for, mill backlogs are still being reduced and the full effects of fall demands will probably not be felt until October. Steel producers plan to take advantage of the breathing spell to make long delayed and much needed repairs to open-hearth furnaces and other equipment.

Whether expectations will be fully realized is, of course, open to question, since the vitality of steel demand has been a surprise to producers and consumers alike throughout the year. Thus far in September, aside from the temporary effects of the holiday interruption, there has been no appreciable change in operating conditions. The larger producers, owing to the diversification of their output, continue to run at 90 to 95 per cent of ingot capacity, and will probably not drop below a 90 per cent rate for several weeks. The current average for Steel Corporation subsidiaries is estimated at 94 per cent. On the other hand, output for some of the smaller producers has dropped to 85 per cent or less.

The middle of this month is now expected to mark the beginning of a fall buying movement in steel, following the completion of the vacation period and the formulation of programs for the remainder of the year by the directing executives of steel consuming companies.

In rails autumn demand has already set in, with an inquiry for 8000 tons from a Southwestern road and with fully 30,000 tons expected to come into the market in the next fortnight.

In structural steel, likewise, there are signs of expanding demand. For a leading Eastern producer of plain material, increased business toward the end of August brought the month's bookings 10 per cent above July. The unusually large amount of prospective tonnage in fabricated steel work has been augmented by fresh inquiries for 30,000 tons, including 10,000 tons for the Chicago Tribune Tower, Chicago. Structural steel work likely to be awarded in New England in the last quarter is double the tonnage placed in the corresponding period in 1928. Structural lettings of the week, at 26,000 tons, were light.

The automobile and railroad equipment industries remain the chief uncertainties affecting the immediate outlook in steel. A substantial tonnage of automobile body sheets for the final quarter has been placed at 4.10c., Pittsburgh, and considerable additional business in sheets from some of the motor car builders is pending, with prospects for a decided improvement in demand from that source before the end of the month, as production gets under way on new models.

Existing prices are being reestablished on most forms of finished steel, but thus far little fourth quarter contract business has actually been taken. A notable exception is the placing of automobile body sheets at 4.10c., following the disappearance of concessions of \$2 a ton. Fourth quarter prices named on other finishes of sheets by a number of companies are 2.85c., Pittsburgh, for black, 2.35c. for blue annealed, 4.20c. for metal furniture sheets and 3.90c. for vitreous enameling stock.

The competitive situation in the pig iron market appears to be growing less acute, following heavy sales by Alabama furnaces, which have reduced their stock piles and buttressed their backlogs. Although \$12.50, Birmingham, is still quoted on the Eastern seaboard, higher prices are now being asked in the Middle West. Pig iron buying has been in fair volume in the East, but considerable fourth-quarter business is still to be placed throughout the country.

Lake shipments of iron ore in August, at 10,806,967 tons, broke all monthly records, surpassing the previous high mark of 10,709,260 tons reached in August, 1926. The movement for the season until Sept. 1 was also a record, aggregating 43,717,787 tons.

Scrap markets show little change except at Pittsburgh, where an easier tone is reflected in a decline of 25c. in heavy melting grade to \$18.75 a ton.

THE IRON AGE composite prices are unchanged, pig iron at \$18.25 a ton and finished steel at 2.398c. a lb. Both are about \$1 a ton higher than a year ago.

A Comparison of Prices

**Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics**

Pig Iron, Per Gross Ton:	Sept. 3, 1929	Aug. 27, 1929	Aug. 6, 1929	Sept. 4, 1928
No. 2 foundry, Philadelphia.	\$21.26	\$21.26	\$21.26	\$20.26
No. 2, Valley furnace.	18.50	18.50	18.50	16.50
No. 2 Southern, Cin'ti.	17.19	17.19	17.69	19.94
No. 2, Birmingham.	14.50	14.50	14.50	16.25
No. 2 foundry, Chicago*.	20.00	20.00	20.00	18.00
Basic, del'd eastern Pa.	19.75	19.75	19.75	19.00
Basic, Valley furnace.	18.50	18.50	18.50	16.00
Valley Bessemer, del'd Pgh.	20.76	20.76	20.76	18.76
Malleable, Chicago*.	20.00	20.00	20.00	18.00
Malleable, Valley.	19.00	19.00	19.00	17.00
Gray forge, Pittsburgh.	19.76	19.76	19.76	18.01
L. S. charcoal, Chicago.	27.04	27.04	27.04	27.04
Ferromanganese, furnace.	105.00	105.00	105.00	105.00

Rails, Billets, Etc., Per Gross Ton:

	Sept. 3, 1929	Aug. 27, 1929	Aug. 6, 1929	Sept. 4, 1928
Rails, heavy, at mill.	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh.	35.00	35.00	35.00	32.00
Sheet bars, Pittsburgh.	35.00	35.00	35.00	32.00
Slabs, Pittsburgh.	35.00	35.00	35.00	32.00
Forging billets, Pittsburgh.	40.00	40.00	40.00	38.00
Wire rods, Pittsburgh.	42.00	42.00	42.00	42.00
Cents	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.85	1.85	1.85	1.90

Finished Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.	1.95	1.95	1.95	1.90
Bars, Chicago.	2.05	2.05	2.05	2.00
Bars, Cleveland.	1.95	1.95	1.95	1.85
Bars, New York.	2.29	2.29	2.29	2.24
Tank plates, Pittsburgh.	1.95	1.95	1.95	1.90
Tank plates, Chicago.	2.05	2.05	2.05	2.00
Tank plates, New York.	2.22½	2.22½	2.22½	2.17½
Structural shapes, Pittsburgh.	1.95	1.95	1.95	1.90
Structural shapes, Chicago.	2.05	2.05	2.05	2.00
Structural shapes, New York.	2.19½	2.19½	2.19½	2.14½
Cold-finished bars, Pittsburgh.	2.30	2.30	2.30	2.10
Hot-rolled strips, Pittsburgh.	1.90	1.90	1.90	1.75
Cold-rolled strips, Pittsburgh.	2.75	2.75	2.75	2.65

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Decline in Steel Output This Month, If Any, Will Be Gradual—Some Uncertainty as to Fall Prospects

PITTSBURGH, Sept. 3.—The general suspension of operations over the holiday week-end will cut down aggregate steel output for the initial week of the new month, but last week mills were run at a rate not far below 95 per cent of capacity.

Gradual decline during the month is anticipated, but, with the larger steel producers in the district operating at close to capacity, the average is not likely to fall much below 90 per cent. Unless demand for finished steel products is showing marked improvement by the end of the month a much sharper decline in ingot production is to be expected.

Specifications slackened in nearly all lines of finished products during the last two weeks in August, but shipments were well sustained, and the aggregate movement of steel from local mills during the month was not very much below that in July.

In bars, shapes, tin plate, strip steel and some finishes of sheets backlog were sharply reduced. Semi-finished steel was available in satisfactory quantities and mills were able to ease the pressure for deliveries on all products except plates and sheets. On plates, delivery promises still range from four to six weeks, while a few of the larger sheet mills are scheduled at close to capacity for the remainder of the month.

Prospects for increased steel consumption during September are still rather uncertain. Rail tonnages are expected to be placed earlier than usual this year, beginning probably before another month has passed.

Reports are heard of possible heavy

car purchases in the near future, but current inquiries are light and near-by car shops are completing old orders rapidly. River transportation companies are expected to place a large number of barges this fall, as the river improvement program is to be

Finished Steel,	Sept. 3, 1929	Aug. 27, 1929	Aug. 6, 1929	Sept. 4, 1928
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh.	2.85	2.85	2.85	2.65
Sheets, black, No. 24, Chicago				
dist. mill.	2.95	2.95	3.05	2.75
Sheets, galv., No. 24, P'gh.	3.50	3.50	3.50	3.40
Sheets, galv., No. 24, Chicago				
dist. mill.	3.60	3.60	3.80	3.60
Sheets, blue, No. 13, P'gh.	2.35	2.35	2.35	2.10
Sheets, blue, No. 13, Chicago				
dist. mill.	2.45	2.45	2.45	2.20
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55
Wire nails, Chicago dist. mill.	2.60	2.60	2.65	2.60
Plain wire, Pittsburgh	2.40	2.40	2.50	2.40
Plain wire, Chicago dist. mill.	2.45	2.45	2.55	2.45
Barbed wire, galv., Pittsburgh	3.20	3.20	3.20	3.20
Barbed wire, galv., Chicago				
dist. mill.	3.30	3.30	3.35	3.25
Tin plate, 100 lb. box, P'gh.	\$5.35	\$5.35	\$5.35	\$5.25

Old Material, Per Gross Ton:

Heavy melting steel, P'gh.	\$18.75	\$19.00	\$18.75	\$16.00
Heavy melting steel, Phila.	16.50	16.50	16.50	18.00
Heavy melting steel, Ch'go.	15.25	15.25	14.75	12.75
Carwheels, Chicago	14.00	14.00	14.00	12.75
Carwheels, Philadelphia	16.50	16.50	16.50	15.50
No. 1 cast, Pittsburgh	15.50	15.50	15.50	14.75
No. 1 cast, Philadelphia	16.50	16.50	16.50	15.50
No. 1 cast, Ch'go (net ton)	14.50	14.50	14.50	14.25
No. 1 RR. wrot., Phila.	16.00	16.00	16.00	13.50
No. 1 RR. wrot., Ch'go (net)	14.00	14.00	13.50	11.25

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt	\$2.65	\$2.65	\$2.75	\$2.75
Foundry coke, prompt	3.75	3.75	3.75	3.75

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	18.12½	18.12½	18.12½	14.75
Electrolytic copper, refinery	17.75	17.75	17.75	14.50
Tin (Straits), New York	45.50	46.12½	47.25	48.00
Zinc, East St. Louis	6.80	6.80	6.80	6.25
Zinc, New York	7.15	7.15	7.15	6.60
Lead, St. Louis	6.55	6.55	6.55	6.22½
Lead, New York	6.75	6.75	6.75	6.40
Antimony (Asiatic), N. Y.	8.62½	9.00	8.75	10.12½

entirely completed next month and inland water transportation will be fully taken advantage of by many additional shippers.

Indications of heavier buying by automobile companies are beginning to appear and a few rush orders for sheets from Michigan companies have recently come to local mills. It is thought that shipments of automobile steel will not decline much further and will show considerable improvement before the end of the month as motor car makers get into production on new models.

Farm implement makers served by Pittsburgh district mills are beginning to get into production on next year's probable requirements and shipments of steel are increasing.

Pipe prospects are good and present mill operations are comparatively high. A number of large line pipe projects are in prospect and feeder pipe for lines under construction is now accounting for considerable tonnage appearing on mill schedules.

The pig iron market is showing its first signs of real activity since early summer. Fourth quarter inquiries are beginning to come before the trade. Scrap is weaker, mill buying still being limited.

Pig Iron.—Sellers in this district

report increasing interest in fourth quarter tonnage, although few actual inquiries have come before the trade. However, consumers' stocks are at a minimum and most of them have no iron coming on old contracts. This leads to the belief that there will be heavy buying of all grades of iron in September in both the Pittsburgh and Valley districts. The leading merchant interest reports considerably better sales than were expected during August, although most of the transactions involved small tonnages. Shipments also held up well during the month, considering the fact that a light foundry melt is usual at this time of the year. The Westinghouse Air Brake Co., Wilmerding, Pa., has closed on a tonnage of foundry and malleable iron for delivery over the remainder of the year. This business was divided between the local merchant interest and a Valley maker, and the malleable is said to have been taken at \$20.26, delivered. This figures back to \$19.50, Pittsburgh district furnace, and \$18.50, Valley, the shading of the Valley price having been necessary to meet the local competition. In the immediate Valley territory, quoted furnace prices are holding, and a recent sale of 3000 tons of basic iron in that district brought the full quoted price of \$18.50. Foundry iron is holding at the same figure, while malleable and Bessemer are offered at \$19. Valley furnace. The Pittsburgh local furnace is quoting prices 50c. above these figures.

Prices per gross ton, f.o.b. Valley furnace:	
Basic	\$18.50
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	19.00
Low phosph., copper free	27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$19.00
No. 2 foundry	19.00
No. 3 foundry	18.50
Malleable	19.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Semi-finished Steel. — Non-integrated steel makers are beginning to show interest in their fourth quarter

semi-finished steel requirements, and, in contrast with the present quarter, are expected to cover early. In the third quarter they had sufficient steel under contract to last for several weeks and in most cases were able to supplement this with small extensions of contracts just sufficient to carry them into the fall. For the fourth quarter they will need to buy their usual tonnages, and the question of price is again assuming importance. During this quarter the price on spot tonnages of billets and slabs has been \$35, Pittsburgh or Youngstown, and although little has been moving at that figure, any open reduction for fourth quarter contracts would give the market a weak tone which the large sellers, who are also makers of finished steel products, are particularly anxious to avoid at this time. On the other hand, buyers of semi-finished steel are not going to pay more for their supplies without vigorous protest. On sheets bars, there is little argument, as the price has held at \$35 all the year, an advance to \$36 for a few months in the spring having been purely nominal. There is no reason to expect any change in the sheet bar price for the last quarter. The same thing is true of wire rods, which have held at \$42, Pittsburgh or Cleveland, during the year.

Bars, Shapes and Plates. — Deliveries on bars and shapes are constantly improving, but plate tonnage is coming to local mills at about the rate at which it is going out. New orders for plates, however, are diminishing and by the middle of October the bulk of the shipments to the railroad car and barge builders will have been made. Unless a fresh buying movement in cars or barges develops by that time, plate tonnages are likely to slip off sharply. Structural mills are still operating at a high rate, particularly on the heavier materials going into bridges. But fabricating shops are rapidly working into their backlog and even the larger interests will soon begin to need business. Large new projects in the district are developing slowly, but formal inquiry is expected shortly on a bridge over the Ohio River at McKee's

Rocks, which will require 15,000 tons of shapes. An addition to the Bell Telephone Building in Pittsburgh will also call for a round tonnage. Shipments of reinforcing bars are holding up, but awards have declined and the bulk of buying on road and other construction jobs to be completed before cold weather sets in has been completed. The merchant bar business has naturally felt the decline in demand for automobile steel, but agricultural implement makers served by Pittsburgh mills are specifying freely and expect heavy fall operations. Prices on the heavy hot-rolled products are holding at 1.95c., Pittsburgh.

Wire Products. — Manufacturers' wire shipments in August were just about equal to those of July and considerably ahead of those in August, last year. However, specifications declined somewhat during the past month and prospects for September are rather uncertain. Prices on manufacturers' wire are holding at 2.50c., Pittsburgh, but it cannot be denied that the weakness in prices to jobbers in nearby territories is having a depressing influence on the market. Nails and barbed wire are also weak in both demand and price. Some improvement in jobber demand for fencing is expected in the next few weeks.

Tubular Goods. — No new developments are reported in the large line pipe projects which have been talked of recently. The line to run from Texas into Chicago by way of Omaha, which is being sponsored by the Texas Co., is now reported to have been placed tentatively some time ago with the Milwaukee fabricator. Another line into Chicago with a similar origin is also being considered by the Doherty interests, and Pittsburgh and Youngstown pipe makers have been asked to prepare estimates. It is stated by informed persons that neither of these lines is a certainty and that negotiations may lead to the abandonment of one plan and the concentration of both interests in one project. Demand for butt-weld pipe shows little change and apparently has not been influenced by the reported increase in building proj-

THE IRON AGE Composite Prices

Finished Steel

Sept. 3, 1929, 2.398c. a Lb.

One week ago	2.398c.
One month ago	2.412c.
One year ago	2.348c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

High

1929 2.412c.
1928 2.391c.
1927 2.453c.
1926 2.453c.
1925 2.560c.

April 2;
Dec. 11;
Jan. 4;
Jan. 5;
Jan. 6;

Low

2.391c.;
2.314c.;
2.293c.;
2.403c.;
2.396c.

Jan. 8;
Jan. 3;
Oct. 25;
May 18;
Aug. 18

Pig Iron

Sept. 3, 1929, \$18.25 a Gross Ton

One week ago	\$18.25
One month ago	18.42
One year ago	17.34
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

High

1929 \$18.71;
1928 18.59;
1927 19.71;
1926 21.54;
1925 22.50;

May 14;
Nov. 27;
Jan. 4;
Jan. 5;
Jan. 13;

Low

\$18.25;
17.04;
17.54;
19.46;
18.96;

Aug. 27;
July 24;
Nov. 1;
July 13;
July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

Base per Lb.

F.o.b. Pittsburgh mill.....	1.95c.
F.o.b. Chicago.....	2.05c.
Del'd Philadelphia.....	2.27c.
Del'd New York.....	2.29c.
Del'd Cleveland.....	1.92½c. to 1.95c.
F.o.b. Cleveland.....	1.90c. to 1.95c.
F.o.b. Lackawanna.....	2.05c.
F.o.b. Birmingham.....	2.20c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.....	2.05c.
F.o.b. Pittsburgh mills, cut lengths.....	2.30c.
F.o.b. Birmingham, mill lengths.....	2.20c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.85c. to 1.90c.
F.o.b. Chicago Heights mill.....	1.95c.
Del'd Philadelphia.....	2.27c.

Iron

Common iron, f.o.b. Chicago.....	2.05c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.12c.
Common iron, del'd New York.....	2.14c.

Tank Plates

Base per Lb.

F.o.b. Pittsburgh mill.....	1.95c.
F.o.b. Chicago.....	2.05c.
F.o.b. Birmingham.....	2.20c.
Del'd Cleveland.....	2.14c.
Del'd Philadelphia.....	2.15c.
F.o.b. Coatesville.....	2.05c.
F.o.b. Sparrows Point.....	2.05c.
F.o.b. Lackawanna.....	2.05c.
Del'd New York.....	2.22½c.
C.i.f. Pacific ports.....	2.35c.

Structural Shapes

Base per Lb.

F.o.b. Pittsburgh mill.....	1.95c.
F.o.b. Chicago.....	2.05c.
F.o.b. Birmingham.....	2.20c.
Del'd Cleveland.....	2.14c.
Del'd Philadelphia.....	2.15c.
F.o.b. Coatesville.....	2.05c.
F.o.b. Sparrows Point.....	2.05c.
F.o.b. Lackawanna.....	2.05c.
Del'd New York.....	2.22½c.
C.i.f. Pacific ports.....	2.35c.

Hot-Rolled Hoops, Bands and Strips

Base per Lb.

6 in. and narrower, P'gh.....	2.00c.
Wider than 6 in., P'gh.....	1.90c.
6 in. and narrower, Chicago.....	2.20c.
Wider than 6 in., Chicago.....	2.10c.
Cooperage stock, P'gh.....	2.20c.
Cooperage stock, Chicago.....	2.30c.

Cold-Finished Steel

Base per Lb.

Bars, f.o.b. Pittsburgh mill.....	2.30c.
Bars, f.o.b. Chicago.....	2.30c.
Bars, Cleveland.....	2.35c.
Shafting, ground, f.o.b. mill.....	2.65c. to 3.60c.
Strips, P'gh.....	2.75c. to 2.85c.
Strips, Cleveland.....	2.75c. to 2.85c.
Strips, del'd Chicago.....	3.05c. to 3.15c.
Strips, Worcester.....	2.90c. to 3.00c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	4.25c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland, to jobbers and retailers.)

Base per Keg

Wire nails.....	\$2.55 to \$2.65
Galvanized nails.....	4.55 to 4.65
Galvanized staples.....	3.25 to 3.35
Polished staples.....	3c. to 3.10c.
Cement coated nails.....	\$2.55 to \$2.65

Base per 100 Lb.

Bright plain wire, No. 6 to No. 9 gage.....	\$2.40 to \$2.50
Annealed fence wire.....	2.55 to 2.65
Spring wire.....	3.50 to 3.60
Galv'd wire, No. 9.....	3.00 to 3.10
Barbed wire, galv'd.....	3.20 to 3.30
Barbed wire, painted.....	2.95 to 3.05
Woven wire fence (per net ton to retailers).....	65.00
Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Birmingham mill prices \$3 a ton higher; Worcester, Mass. (wire), mill \$3 a ton higher on production of that plant; Duluth, Minn., mill \$2 a ton higher; Anderson, Ind., \$1 higher.	

Cut Nails

Per 100 Lb.

Carloads, Wheeling, Reading or North-umberland, Pa.....	\$2.70
Less carloads, Wheeling or Reading.....	2.80

Light Plates

No. 10, blue annealed, f.o.b. P'gh.....	2.10c. to 2.20c.
No. 10, blue annealed, f.o.b. Chicago dist.....	2.30c.
No. 10, blue annealed, del'd Phila.....	2.42c. to 2.52c.
No. 10, blue annealed, B'ham.....	2.35c.

Sheets

Blue Annealed

Base per Lb.

No. 13, f.o.b. P'gh.....	2.25c. to 2.35c.
No. 13, f.o.b. Chicago dist.....	2.45c.
No. 13, del'd Philadelphia.....	2.67c.
No. 13, blue annealed, B'ham.....	2.50c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.85c.
No. 24, f.o.b. Chicago dist. mill.....	2.95c. to 3.00c.
No. 24, del'd Philadelphia.....	3.17c. to 3.27c.
No. 24, f.o.b. Birmingham.....	3.10c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh.....	4.10c. to 4.20c.
	Galvanized

No. 24, f.o.b. Pittsburgh.....	3.50c. to 3.60c.
No. 24, f.o.b. Chicago dist. mill.....	3.60c. to 3.70c.
No. 24, del'd Cleveland.....	3.59c. to 3.69c.
No. 24, del'd Philadelphia.....	3.92c. to 4.02c.
No. 24, f.o.b. Birmingham.....	3.75c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.90c. to 3.00c.
No. 28, f.o.b. Chicago dist. mill.....	3.00c. to 3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	4.00c. to 4.10c.
	Long Ternes

No. 24, 8-lb. coating, f.o.b. mill.....	4.10c.
	Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.90c.
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Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mills.....	\$5.35
Standard cokes, f.o.b. Gary.....	5.45

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$11.20	25-lb. coating I.C. \$16.70
15-lb. coating I.C. 14.00	30-lb. coating I.C. 17.75
20-lb. coating I.C. 15.30	40-lb. coating I.C. 19.85

Alloy Steel Bars

(F.o.b. makers' mill)

Alloy Quality Bar Base, 2.65c. per Lb.	2.75c. per Lb.
Alloy Numbers	Differential

2000 (1½% Nickel).....	\$0.25
2100 (1½% Nickel).....	0.55
2300 (3½% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bars.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50</td

ects during July and August. The year as a whole has been far from satisfactory in this product. Shipments of mechanical tubing are declining, but still are at a high rate for this season. Demand for boiler tubing is fairly good and there is a satisfactory movement of locomotive tubing.

Strip Steel.—Hot-rolled strip mills began the week with operating schedules well below 75 per cent of capacity, while cold-rolling units will do little better. Business has been reduced strictly to a hand-to-mouth basis and specifications received during the next week or two may lead to improvement on very short notice. On the whole, however, heavier shipping orders are not expected to develop before the end of the month, as at least two points, and other users made in this and nearby districts goes to the automobile industry. Companies supplying the Ford Motor Co. are in a fairly good position, but this company's sources of supply are scattered, with no maker receiving enough tonnage to maintain a very high operating rate at this time. In the face of declining demand, prices are holding remarkably well, with the hot-rolled material quoted at 2c., Pittsburgh, for 6-in. and narrower, and 1.90c., for the wider sizes. On cold rolled, quotations range from 2.75c. to 2.85c., Pittsburgh or Cleveland, depending on the tonnage.

Cold-Finished Steel Bars and Shafting.—Shipments last month were at a fair rate for this season of the year and showed little change from July. No marked improvement in demand is expected early this month, but present specifications are coming from diversified sources and the industry is in a healthy condition. Particular satisfaction is derived from the price structure, as quotations are steady at 2.30c., base Pitts-

burgh. On fourth quarter business, the recently announced card of extras becomes effective and producers will soon open their books for that period.

Sheets.—Trends in the sheet market are mixed and, while a number of independent companies report a marked decline in specifications during the last two weeks of August, one of the largest makers reduced its obligations during the month only 1 or 2 per cent. The leading interest operated its mills last week at as high a rate as any during the year, the percentage having been barely under 100. One large independent company in this district is also at capacity, while others range down to about 90 per cent. The average for the industry as a whole is certainly not below 95 per cent, although this high rate is rapidly reducing the backlog of many companies. With few exceptions, deliveries on all the common finishes of sheets can be made in four weeks or less, and with some companies immediate rolling schedules may be arranged. All the large sheet consuming industries, except the automobile, are still very active users, and large makers of special finished sheets are in a particularly favorable position. The requirements of the agricultural implement industry are large and seem to be tending toward increases. Heavy shipments are going to the railroad car builders, but car shops in this district are rapidly completing recent orders and will sharply curtail their steel orders in about six weeks unless more car orders are placed. Prices are no weaker, and leading independent manufacturers of galvanized sheets are soon expected to withdraw the \$2 preferential to jobbers, which has been largely responsible for price weakness over the last year. Jobbers and also some consumers are still able to buy galvanized sheets at 3.50c., Pittsburgh, but some mills are firmly adhering to the 3.60c. base. On black sheets, the prevailing price is 2.85c., Pittsburgh, and no further weakness in blue annealed is reported. The 4c., Pittsburgh, price on automobile sheets mentioned last week has been made only in isolated cases to very large buyers and the general market is better represented by 4.10c.

Tin Plate.—Operations in Pittsburgh and tributary districts last week averaged a little better than 75 per cent of capacity, but would have been somewhat higher this week had it not been for the holiday. The leading interest operated its mills at better than 85 per cent, and will continue that schedule. Little improvement is expected this month, as the present season's requirements of the larger container manufacturers have nearly all been shipped, and it is too early for next year's tonnage.

Coal and Coke.—The coke market has not gained strength in the last week, but production has been further adjusted to reduced demand and quotations of less than \$2.75, Connellsville, on the furnace grade are soon expected to disappear. Ship-

ments of foundry coke have not improved, but demand seems to be somewhat better and a stronger price situation is developing. Coal demand is also improving seasonably, but prices have gained little strength.

Old Material.—In another week of very little mill buying, prices seem to be somewhat weaker, and No. 1 heavy melting steel is now quotable at \$18.50 to \$19. One consumer was able to buy a small tonnage at \$18.50, but dealers are paying this price and more to cover old sales, and it is unlikely that any large tonnage will be sold at this time at much under \$19. The closing of the Pennsylvania Railroad list tomorrow is being anxiously watched by dealers in this district and will probably indicate to some extent the trend of the market. Shipments of scrap to local mills are still rather heavy, although open-hearth operations have been considerably reduced at least two points, and other users have held up shipments in order to clear up stock piles or rearrange their yards. The course of the market for steel-making scrap during the next two months will depend entirely upon the rate of steel operations. Some of the other grades are slightly weaker, particularly machine shop turnings and short shoveling steel turnings, which have recently been quoted at rather high levels as a result of heavy buying to supplement the use of the higher-priced grades of steel. The monthly list of the Baltimore & Ohio Railroad, which will close on Sept. 9, contains 19,000 tons of steel scrap, including 6000 tons of rails and 2000 tons of No. 1 heavy melting.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:

No. 1 heavy melting steel	\$18.50 to \$19.00
No. 2 heavy melting steel	16.50 to 17.00
Scrap rails	18.00 to 18.50
Compressed sheet steel	18.25 to 18.75
Bundled sheets, sides and ends	17.00 to 17.50
Cast iron earwheels	16.50 to 17.00
Sheet bar crops, ordinary	20.00 to 20.50
Heavy breakable cast	12.50 to 13.00
No. 2 railroad wrought	18.50 to 19.00
Hvy. steel axle turnings	16.50 to 17.00
Machine shop turnings	12.50 to 13.00

Acid Open-Hearth Grades:

Railr. knuckles and couplers	21.75 to 22.25
Railr. coil and leaf springs	21.75 to 22.25
Rolled steel wheels	21.75 to 22.25
Low phos. billet and bloom ends	22.50 to 23.00
Low phos. mill plates	22.50 to 23.00
Low phos. light grades	20.50 to 21.50
Low phos. sheet bar crops	20.50 to 21.50
Heavy steel axle turnings	16.50 to 17.00

Electric Furnace Grades:

Low phos. punchings	20.00 to 21.00
Hvy. steel axle turnings	16.50 to 17.00

Blast Furnace Grades:

Short shoveling steel turnings	13.00 to 13.50
Short mixed borings and turnings	12.00 to 12.50
Cast iron borings	12.00 to 12.50

Rolling Mill Grades:

Steel car axles	21.50 to 22.00
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Cupola Grades:

No. 1 cast	15.00 to 16.00
Rails 3 ft. and under	20.00 to 21.00

American LaFrance & Foamite Corporation, manufacturer of motor fire apparatus and fire extinguishing equipment, is moving its Utica, N. Y., branch office and factory to its main plant at Elmira, N. Y.

Warehouse Prices, f.o.b. Pittsburgh

Base per Lb.

Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.80c.
Galv. sheets (No. 24), 25 or more bundles	4.55c.
Light plates, blue ann'd (No. 10), 1 to 10 plates	3.45c.
Blue annealed sheets (No. 13), 1 to 10 sheets	3.60c.
Galv. corrug. sheets (No. 28), per square	\$4.43
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count	60 per cent off list
Machine bolts, 100 count	60 per cent off list
Carriage bolts, 100 count	60 per cent off list
Nuts, all styles, 100 count	60 per cent off list
Large rivets, base per 100 lb.	\$3.50
Wire, black soft, ann'd, base per 100 lb.	\$3.00 to 3.10
Wire, galv. soft, base per 100 lb.	3.00 to 3.10
Common wire nails, per keg	2.90 to 3.00
Cement coated nails, per keg	3.05

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

Per Gross Ton

Rerolling, 4-in. and under 10 in., Pittsburgh	\$35.00
Rerolling, 4-in. and under 10 in., Youngstown	35.00
Rerolling, 4-in. and under 10 in., Cleveland	35.00
Rerolling, 4-in. and under 10 in., Chicago	37.00
Forging quality, Pittsburgh	\$40.00 to 41.00

Sheet Bars

(Open Hearth or Bessemer)

Per Gross Ton

Pittsburgh	\$35.00
Youngstown	35.00
Cleveland	35.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

Per Gross Ton

Pittsburgh	\$35.00
Youngstown	35.00
Cleveland	35.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

Per Lb.

Grooved	.185c. to 1.90c.
Universal	.185c. to 1.90c.
Sheared	.185c. to 1.90c.

Wire Rods

(Common soft, base)

Per Gross Ton

Pittsburgh	\$42.00
Cleveland	42.00
Chicago	43.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Per Gross Ton

Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

Per Unit

Iron ore, low phos, copper free, 55 to 58%	
iron in dry Spanish or Algerian	12.00c.
Iron ore, low phos, Swedish, average 68% iron	12.50c.
Iron ore, basis Swedish, average 65% iron	11.00c.
Manganese ore, washed, 52% manganese from the Caucasus	32.00c. to 33.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	33.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$16.25 to \$16.50

Per Gross Ton

Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
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Per Lb.

Molybdenum ore, 85% concentrates of MoS ₂ , delivered	50c. to 55c.
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Coke

Per Net Ton

Furnace, f.o.b. Connellsville prompt	\$2.65 to \$2.75
Foundry, f.o.b. Connellsville prompt	\$3.75 to 4.75
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis..	9.00

Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines	\$1.25 to \$1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in. f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

Per Gross Ton

Domestic, 80%, seaboard	\$105.00
Foreign, 80%, Atlantic or Gulf port, duty paid	105.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	\$31.00 to \$34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

Per Gross Ton Delivered

50%	\$83.50
75%	130.00
10%	\$35.00
11%	37.00
12%	\$39.00
14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton	Per Gross Ton
10%	\$30.00
11%	32.00
12%	\$34.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton	Per Gross Ton
6%	\$23.00
7%	24.00
8%	25.00
9%	26.00
10%	\$27.00 to \$28.00
11%	29.00 to 30.00
12%	31.00 to 32.00

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd

\$1.40 to \$1.50

Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads

\$11.00c.

Ferrovanadium, per lb. contained vanadium, f.o.b. furnace

\$3.15 to \$3.65

Ferrocobaltitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads

\$160.00

Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton

\$91.00

Ferrophosphorus, electric 24%, f.o.b. Alton, Ill., per gross ton

\$122.50

Fluxes and Refractories

Fluorspar

Per Net Ton

Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines

\$18.00

No. 2 lump, Illinois and Kentucky mines

20.00

Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid

\$18.25 to \$18.75

Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines

32.50

Fire Clay Brick

Per 1000 f.o.b. Works

High-Heat Intermediate Duty Brick

Pennsylvania \$43.00 to \$46.00 \$35.00 to \$38.00

Maryland 43.00 to 46.00 35.00 to 38.00

New Jersey 50.00 to 65.00

Ohio 43.00 to 46.00 35.00 to 38.00

Kentucky 43.00 to 46.00 35.00 to 38.00

Missouri 43.00 to 46.00 35.00 to 38.00

Illinois 43.00 to 46.00 35.00 to 38.00

Ground fire clay, per ton 7.00

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania \$43.00

Chicago 52.00

Birmingham 60.00

Silica clay, per ton \$8.50 to 10.00

Magnesite Brick

Per Net Ton

Standard sizes, f.o.b. Baltimore and Chester, Pa. \$65.00

Grain magnesite, f.o.b. Baltimore and Chester, Pa. 40.00

Standard size 45.00

Chrome Brick

Per Net Ton

Standard size \$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine bolts	70
Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	7.00c. to 6.75c. per lb. off list

Bolts and Nuts

Per Cent Off List

Semi-finished hexagons nuts

70

Semi-finished hexagons castellated nuts, S.A.E.

70

Stove bolts in packages, P'gh., 75, 20, 10 and 5

Stove bolts in packages, Chicago, 75, 20, 10 and 5

Stove bolts in packages, Cleveland, 75, 20, 10 and 5

Stove bolts in bulk, P'gh., 75, 20, 10, 5 and 2½

Stove bolts in bulk, Chicago, 75, 20, 10, 5 and 2½

Tire bolts

60, 5 and 5

Chicago

Steel Specifications Expand Slowly After Moderate Recession—Ingot Output Still at Near-Capacity Rate

CHICAGO, Sept. 3.—Specifications for finished steel are expanding, after several weeks in which no gains were recorded. The improvement is not impressive from the standpoint of reflecting larger output by the major manufacturing groups which cut production in the early summer months.

There is still some uncertainty as to the course of business in farm machinery, though at the moment activity is at a substantial pace. Scattered reports lead to the impression that automobile production is a trifle heavier, but schedules for steel shipments reflect this only in small degree.

Railroad car builders are close to the point when new orders will come too late to prevent a drop from the present rate of building. The only order of moment this week is for 500 underframes placed with a Western builder. It is reported that action will not be taken until Sept. 12 on 1000 cars to be purchased by the St. Paul. The prospect for locomotive business from Western railroads is more favorable. The Frisco Lines are contemplating coming into the market; the Missouri Pacific is considering 25 new locomotives and the Burlington may buy 10 engines.

Broader interest in new building construction is shown by reports from many of the cities in the West. A large office and hotel project is well under way in Cincinnati. Several new buildings requiring large tonnages of steel are being planned at Milwaukee. At New Orleans, the outlook is reported bright for the fall months.

Taken as a whole, the local steel market remains as in recent weeks. Output of steel ingots is near capacity, though signs are increasing that curtailment may be necessary late in September. New sales do not sustain backlogs. Improvement in deliveries tends only to make users more insistent on still better promises.

Pig Iron.—The Federal furnace, which has been down for repairs, was relighted Sept. 1, and the Iroquois stack, which also has been out for needed repairs, will be blown in about Sept. 15, according to present plans of the operators. Active merchant stacks now number five, including the Zenith furnace at Duluth. Prices for Southern iron are still mixed. One producer is said to have withdrawn from the market with full order books. Others are quoting \$13.50 a ton, Birmingham, for tonnage lots and \$14 for small orders. Delivery at Chicago is figured on the all-rail rate, bringing the asking delivered price range to \$19.51 to \$20.01. Against these prices, however, is a sale of 1500 tons made early in the week to a western Illinois melter at \$12.50 a ton, Birmingham. Shipments of silvery are steady and sales total about 1000 tons in the last week. Orders for charcoal iron range from carloads up to 150 tons each. The Northern iron market is well established at \$20 a ton, local furnace.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25...	\$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75...	20.50
Malleable, not over 2.25 sil....	20.00
High phosphorus.....	20.00
Lake Super. charcoal, sil. 1.50.....	27.04
So'th'n No. 2 fdy. (all rail).....	19.01
Low phosph., sil. 1 to 2, copper free.....	29.50
Silvery, sil. 8 per cent.....	29.79
Bess. ferrosilicon, 14-15 per cent...	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

ing. Demand is broad and well diversified. Both farm implement and automobile manufacturers are taking bars at a steady rate. It is the impression here that the automobile industry will place heavier specifications about the middle of September. Road machinery builders and crane shops are operating at close to capacity, a situation which has prevailed throughout the year. Output of alloy steel bars holds steady at 70 per cent of capacity. Specifications are equal to shipments, but new buying is in small volume and backlog are light. Prices for iron bars are steady at 2.05c. a lb., Chicago. With much of the railroad needs out of the way, both new business and releases against old obligations are light. Rail steel bar mills continue to operate on a double-turn basis, though in some cases hours have been cut. Prices remain steady at 1.95c. a lb., Chicago Heights, and it is the general impression that there will be no change when books are opened for the fourth quarter. Deliveries range from two to three weeks. Stocks of fence post material are in good shape for the expected fall demand, which is beginning to make itself felt.

Rails and Track Supplies.—Rail mill operations hold to 70 per cent of capacity and schedules are arranged for September. Fresh inquiry is for 8000 tons for a Southwestern railroad, and it is rather commonly expected by the local trade that fully 30,000 tons for fall rolling will be in the market by the middle of September. New orders for light rails can be measured only by a few carloads; however, shipments in the last four weeks have been well above the average for several years.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. **Per lb.:** Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.15c.; angle bars, 2.75c.

Structural Material.—Although deliveries on shapes have been steadily improving, the range now being four to six weeks, fabricators find it difficult to obtain steel to meet their obligations. Contractors are rushing work to avoid erection in cold weather. Shops, still pursuing the policy of holding stocks at a minimum, report mill deliveries unsatisfactory. The general level of prices being obtained for fabricated material is too low to permit shops to draw on warehouses, and, moreover, the character of much of the material needed is not of the kind and size usually carried by jobbers. The net result is that mills are being forced to rearrange schedules whereby deliveries on some shapes can be given in 10 days. Fresh inquiry is developing over a wide territory. At Chicago, more than 10,000 tons will be needed for an addition to the Chicago Tribune plant. At New Orleans, where a new pumping station is being considered, the building program is steady and the outlook is considered satisfactory. New office buildings requiring round tonnages are

being projected at Louisville, Ky., Des Moines, Iowa, and Milwaukee. At Cincinnati, there will be erected on property owned by the Presbyterian Church a 43-story office, hotel and garage building. The Foshay Tower addition at Minneapolis, which calls for 1700 tons, has been awarded to a Chicago fabricator.

Mill prices on plain material, per lb.: 2.05c. base, Chicago.

Cast Iron Pipe.—This market remains listless, though there is now more indication that heavier purchases may be made in the late fall. A number of municipalities which elected new officials last spring are arranging programs, and several engineers state that plans are near completion for several sizable water main projects. Northfield, Ill., has awarded 200 tons of cast iron pipe to a contractor, and Crystal Falls, Mich., has closed for 100 tons of 10-in. pipe with the Central Foundry Co. Lamar, Colo., has placed 12 miles of pipe. The 14-in. pipe is reported to have been taken by the United States Pipe & Foundry Co., and the smaller sizes by the McWane Cast Iron Pipe Co. Chicago is giving consideration to the purchase of a large tonnage of 48-in. feeder mains. Carload orders are fewer in number, except from the railroads, which are finding wider use for cast iron pipe. Prices are steady and deliveries are prompt on most sizes.

Prices per net ton, del'd Chicago: Water pipe, 6-in. and over, \$45.20 to \$46.20; 4-in., \$49.20 to \$50.20; Class A and gas pipe, \$3 extra.

Bolts, Nuts and Rivets.—Shipments of these commodities in August were about 10 per cent lighter than in the corresponding month last year. Fourth quarter contracts are being prepared at unchanged price schedules. Output is near 70 per cent of capacity, and stocks in the hands of producers are in good condition for the fall trade. Specifications continue at the August rate.

Wire Products.—Production of wire products has been cut to 63 per cent of capacity as demand dwindles. At this rate shipments are equal to production and mill stocks remain stationary, except in woven wire fencing, in which commodity an effort is being made to increase quantities in the hands of producers. The jobbing trade finds demand less insistent, while on the other hand the use of manufacturers' wire is holding at a level even with that in the previous week. Shipments of nails are light and prices are weak, as shown by concessions often granted from current quotations. Use of reinforcing mesh is fully equal to that of a year ago at this time. Shipments are large as contractors order out material with the expectation of completing contracts before frost. Western producers of wire and wire products anticipate an active fall trade, which they believe will open about the middle of September.

Plates.—Total inquiry for tank plates, augmented this week by 5000

tons for two new projects, is in excess of 14,000 tons. One project calls for 2500 tons for delivery in the Southwest and a like tonnage is before the trade for export. The Winkler Engineering Corporation, Wichita, Kan., has ordered 750 tons of tankage which will be fabricated at Joliet, Ill. Local plate shops are well engaged and have satisfactory backlog. It is reported from St. Louis that makers of large tanks are only moderately busy, while light tank manufacturers are operating double turn with large orders ahead. Diversified orders for plates are in fair volume. Chicago producers will promise deliveries in four to 10 weeks, and when orders match with rollings somewhat better can be done. Producers in the East name three weeks or better. It is reported that definite action will not be taken on the 1000 cars for the St. Paul railroad until about Sept. 12. The local plate market is strong, with prices remaining firm at 2.05c. a lb., Chicago.

Reinforcing Bars.—Bending shops in this district are increasing output as a result of recent orders. Several fabricators are now engaged at close to capacity, while for the district as a whole the increase is not far from 10 per cent. The enlarged volume of contracts, as well as some stimulation in new inquiries, is bringing about a more determined effort to get higher prices, but bids already submitted are checking this move. Rail steel bars are commonly quoted at 1.85c. to 1.95c. a lb., Chicago Heights, and the billet steel commodity brings 2.15c. a lb., Chicago, with less desirable business being taken at 2.35c. Large awards are absent from the market this week, but small tonnages, many of which are for alteration work, are more numerous than in recent weeks.

Coke.—Shipments of by-product foundry coke are approximately equal to local oven capacity. With the bulk of users under contract for the remainder of the year, current buying is of little moment. The price remains at \$8 a ton, Chicago ovens.

Old Material.—Both tendencies and opinions in the Chicago scrap market

are decidedly mixed. One mill has bought 5000 tons of heavy melting steel at \$15.75 a ton, delivered, which is the price reached in the recent advance. Short interests contend that lower prices are in the offing, while there are those who confidently believe that the market may rise to higher levels. Balanced against the prospect of lighter demand for the heavy tonnage grades are lack of stocks in yards, curtailment of production of scrap and the fact that many makers, who in some cases are also buyers of scrap, are holding tonnages in anticipation of higher prices. Demand for specialties, especially from malleable and steel foundries, is well sustained. A 1000-ton order for railroad malleable has been placed by a melter at Peoria, Ill., at \$18.50 a gross ton, delivered. Gray iron foundries are using smaller quantities of scrap. Taken as a whole, there still seems to be a good balance between consumption and production of scrap, and on this score some sellers look for a steady market. The Pennsylvania will sell 50,000 tons on Sept. 4.

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:		
Heavy melting steel.....	\$15.25 to	\$15.75
Shoveling steel.....	15.25 to	15.75
Frogs, switches and guards,		
cut apart, and misc. rails	16.75 to	17.25
Hydraul. compressed sheets	13.75 to	14.25
Drop forge flashings.....	10.75 to	11.25
No. 1 busheling.....	13.25 to	13.75
Forg'd cast and r'l'd steel		
carwheels.....	18.75 to	19.25
Railroad tires, charg. box		
size.....	18.75 to	19.25
Railroad leaf springs cut		
apart.....	18.75 to	19.25

Acid Open-Hearth Grades:

Steel couplers and knuckles	17.00 to	17.50
Coil springs.....	19.00 to	19.50

Electric Furnace Grades:

Axle turnings.....	14.50 to	15.00
Low phos. punchings.....	17.00 to	17.50
Low phos. plates, 12 in.		
and under.....	17.00 to	17.50

Blast Furnace Grades:

Axle turnings.....	13.00 to	13.50
Cast iron borings.....	10.50 to	11.00
Short shoveling turnings.....	10.50 to	11.00

Machine shop turnings.....

7.50 to 8.00

Rolling Mill Grades:

Iron rails.....	16.00 to	16.50
Rerolling rails.....	18.00 to	18.50

Cupola Grades:

Steel rails less than 3 ft..	17.50 to	18.50
Steel rails less than 2 ft..	20.00 to	20.50
Angle bars, steel.....	17.00 to	17.50
Cast iron carwheels.....	14.00 to	14.50

Malleable Grades:

Railroad.....	17.00 to	17.50
Agricultural.....	15.50 to	16.00

Miscellaneous:

*Relaying rails, 56 to 60 lb.	23.00 to	25.00
65 lb. and		
heav.....	26.00 to	31.00

Per Net Ton

Rolling Mill Grades:

Iron angle and splice bars	15.00 to	15.50
Iron arch bars and transoms	21.50 to	22.00

Iron car axles.....

26.50 to 27.00

Steel car axles.....

17.50 to 18.00

No. 1 railroad wrought.....

14.00 to 14.50

No. 2 railroad wrought.....

13.75 to 14.25

No. 1 busheling.....

9.00 to 9.50

No. 2 busheling.....

7.00 to 7.50

Locomotive tires, smooth.....

14.50 to 15.00

Pipes and flues.....

10.00 to 10.50

Cupola Grades:

No. 1 machinery cast.....

14.50 to 15.00

No. 1 railroad cast.....

14.00 to 14.50

No. 1 agricultural cast.....

13.25 to 13.75

Stove plates.....

12.25 to 12.75

Grate bars.....

11.75 to 12.25

Brake shoes.....

11.50 to 12.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

New York

Pig Iron Bookings 25,000 Tons, Sharp Competition Stimulating Demand—Structural Steel Orders Heavier

NEW YORK, Sept. 3.—Sharp competition in the pig iron market appears to have stimulated demand. Bookings for the week, including sales of iron for shipment to plants outside this district, totaled 25,000 tons. An inquiry for 10,000 tons of basic for a Bridgeport, Conn., plant, is reported still pending. The Thatcher Co., Newark, N. J., has closed for 2000 tons of foundry for its Garwood, N. J., works. The General Electric Co. has placed orders for 5000 tons for its Schenectady, N. Y., Bayway, N. J., and New England foundries. The American Radiator Co.'s purchases over the past three weeks have totaled 22,000 tons, and it still has 15,000 tons to buy for plants in various districts. Southern and eastern Pennsylvania irons have figured more largely in recent transactions than Buffalo brands. Alabama foundry grade is still available at as low as \$12.50, base Birmingham, although higher prices are asked when Northern manganese specifications are duplicated. No. 2 plain from eastern Pennsylvania is being sold at \$19, furnace, for delivery in this section, and that price has been shaded in a few instances. Buffalo foundry iron still ranges from \$17.50 to \$18, base furnace, with the price attitude of producers tending toward greater firmness. Buffalo producers have been shipping more iron to Detroit and Chicago than last year, and are not burdened with excessive stocks at furnaces. One steel works interest is reported to have virtually withdrawn from the market, and another Buffalo steel plant is conserving its pig iron supplies because of furnace trouble. The Port Henry, N. Y., stack, which was recently blown out for relining, will not get back into blast for about six weeks. Pig iron shipments are going forward to foundries without interruption; in fact, melt shows some sign of improving. Better operations are noted in the radiator industry, which has been running at 55 to 60 per cent of capacity for several months.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	\$22.41 to \$22.91
*Buf. No. 2, del'd east, N. J.	20.78 to 21.28
East Pa. No. 2 fdy., sil. 1.75 to 2.25	20.39 to 21.52
East Pa. No. 2X fdy., sil. 2.25 to 2.75	20.89 to 22.02

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Cast Iron Pipe.—Prices are unchanged and show no tendency to advance. Northern foundries are well occupied with the larger sizes of pressure pipe, but are seeking tonnage in the smaller diameters. The United States Army has awarded about 75 tons of 8 and 12-in. centrifugal pipe for Camp Stotsenburg at Manila, P. I., to the American Cast Iron Pipe Co.

Private buying has been limited to occasional carload lots. About 6000 tons of water pipe for the Eastman Kodak Co., Rochester, N. Y., has not yet been awarded.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$33.60 to \$34.60; 4-in. and 5-in., \$36.60 to \$37.60; 3-in., \$43.60 to \$44.60. Class A and gas pipe, \$3 extra.

Warehouse Business.—Although August sales of material from stock compared favorably with July, the second half of the month was rather quiet. Consumers have been limiting their purchases to small orders. Black, galvanized and blue annealed sheet prices are still subject to occasional shading on desirable business.

Reinforcing Bars.—Although small lettings have been fairly numerous, jobs running 100 tons or over have been scarce. Prices are unchanged.

Billet steel reinforcing bars in 40, 50 and 60-ft. lengths, 2.05c. per lb., Pittsburgh, and 2.30c. per lb., Pittsburgh warehouse, for cut lengths. Out of New York warehouse, 2.90c. per lb. for lots of 5 tons or more, 3.05c. for lots of 2 to 5 tons and 3.30c. for less than 2 tons, all delivered at job.

Finished Steel.—The leading Eastern producer of structural steel states that the increased rate of bookings during the latter half of August, as compared with the slackened buying in the first half, brought the total for the month to a point 10 per cent above July orders. Structural awards have been holding up well for this time of the year. A considerable portion of the tonnage in the New York metropolitan area is going into apartment buildings and non-industrial structures of various kinds. A substantial amount of plate business is pending, including 2000 tons for a car builder near by. Prices of bars, shapes and plates are firm and unchanged. A few fourth quarter inquiries have appeared, but mills are not yet ready to accept orders for that period. However, they have indicated that quotations for delivery over the remainder of the year will stay at the current level. An important sheet steel manufacturer reports that August sales exceeded those of July by a comfortable margin. Some sheet mills still are engaged at capacity. Prices are firm at 3.50c., Pittsburgh, for galvanized, 2.85c. for black and 2.35c. for No. 13 gage blue annealed. The wire market is rather dull, with little fresh business coming out at the moment. Common wire nails are priced at \$2.50 to \$2.55 a keg, Pittsburgh, and plain wire at \$2.40 a 100 lb., Pittsburgh.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.29c.; plates, 2.22½c.; structural shapes, 2.19½c.; bar iron, 2.14c.

Coke.—Prices on furnace coke are easier. Better beehive grades, recently held at \$2.80 a net ton, Connellsburg, are now available at \$2.70, with

\$2.65 a possibility. So-called standard furnace coke ranges from \$2.60 to \$2.65, Connellsburg. Special brands of beehive foundry coke are still bringing \$4.85, Connellsburg, or \$8.76, delivered to northern New Jersey points. Other brands are available at as low as \$3.75, Connellsburg. By-product foundry coke is quoted at \$9 to \$9.40 a net ton, Jersey City or Newark, and \$10.06, New York or Brooklyn.

Warehouse Prices, f.o.b. New York

Base per Lb.

Plates and structural shapes.....	3.30c.
Soft steel bars, small shapes.....	3.25c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal.....	7.00c. to 7.25c.

Cold-fin. shafting and screw stock—

Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.

Cold-roll. strip, soft and quarter hard.....

Hoops.....	5.15c. to 5.40c.
Bands.....	3.75c.

Blue ann'd sheets (No. 10).....	3.85c. to 3.90c.
Long terne sheets (No. 24).....	5.80c.

Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.

Wire, galv. annealed.....	5.15c.
Tire steel, 1½ x 1½ in. and larger.....	3.30c.

Smooth finish, 1 to 2½ x ¼ in. and larger.....	3.65c.
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Open-hearth spring steel, bases,.....	4.50c. to 7.00c.
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Per Cent

Machine bolts, cut thread:.....	Off List
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¾ x 6 in. and smaller.....	60
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1 x 30 in. and smaller.....	.50 to 50 and 10
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Carriage bolts, cut thread:

½ x 6 in. and smaller.....	60
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¾ x 20 in. and smaller.....	.50 to 50 and 10
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Coach screws:

½ x 6 in. and smaller.....	60
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1 x 6 in. and smaller.....	.50 to 50 and 10
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Boiler Tubes— Per 100 Ft.

Lap welded, 2-in.....	\$17.33
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Seamless steel, 2-in.....	20.24
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Charcoal iron, 2-in.....	25.00
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Charcoal iron, 4-in.....	67.00
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Discounts on Welded Pipe

Standard Steel—	Black	Galv.
½-in. butt.....	46	29
¾-in. butt.....	51	37
1-½-in. butt.....	53	39
2½-6-in. lap.....	48	35
7 and 8-in. lap.....	44	17
11 and 12-in. lap.....	37	12

Wrought Iron—

½-in. butt.....	5	+19
¾-in. butt.....	11	+9
1-½-in. butt.....	14	+6
2-in. lap.....	5	+14
3-6-in. lap.....	11	+6
7-12-in. lap.....	3	+16

Tin Plate (14 x 20 in.)

Prime	Seconds
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Coke, 100 lb, base box.....	\$6.45	\$6.20
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Charcoal, per Box—	A	AAA
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IC.....	\$9.70	\$12.10
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IX.....	12.00	14.25
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IXX.....	13.90	16.00
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Terne Plate (14 x 20 in.)

IC—20-lb. coating.....	\$10.00	to \$11.00
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IC—30-lb. coating.....	12.00	to 13.00
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IC—40-lb. coating.....	13.75	to 14.25
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Sheets, Box Annealed—Black, C. R.

One Pass

Per Lb.

Nos. 18 to 20.....	3.80c.
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No. 22.....	3.95c.
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No. 24.....	4.00c.
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No. 26.....	4.10c.
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No. 28*.....	4.25c.
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No. 30.....	4.50c.
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Sheets, Galvanized

Per Lb.

No. 14.....	4.40c.
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No. 16.....	4.25c.
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No. 18.....	4.40c.
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No. 20.....	4.50c.
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No. 24.....	4.60c.
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No. 26.....	5.00c.
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No. 28*.....	5.25c.
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No. 30.....	5.65c.
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*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

Old Material.—No transactions of consequence have been reported in the past week. Consumers of scrap are in most cases offering to buy at the prices now being paid by brokers to fill their present contracts. As a result, prices have not developed any definite tendency either to advance or recede. No. 1 heavy melting steel is being bought at \$16 to \$16.50 a ton, delivered eastern Pennsylvania. No. 2 heavy melting steel is still moving in substantial tonnages to the consumer at Bethlehem, Pa., being taken in at a minimum reduction of \$1.50 a ton from the price of No. 1 steel, or \$15 a ton, delivered. As brokers are unable to offer more than \$14.25 a ton, delivered to other eastern Pennsylvania mills, on the basis of contracts at \$14.50 a ton, holders of this grade prefer to ship to Bethlehem.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel.	\$12.75 to \$13.35
Heavy melting steel (yard)	8.00 to 9.75
No. 1 hvy. breakable cast.	10.75 to 11.75
Stove plate (steel works).	8.00 to 8.25
Locomotive grate bars....	8.25 to 8.75
Machine shop turnings....	7.75 to 8.00
Short shoveling turnings....	8.00 to 9.00
Cast borings (blast furn. or steel works)....	7.00 to 7.75
Mixed borings and turnings....	6.75 to 7.75
Steel car axles.....	19.50 to 20.00
Iron car axles.....	24.00 to 25.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	10.75
Forge fire.....	9.75 to 10.25
No. 1 railroad wrought....	12.00 to 12.50
No. 1 yard wrought, long....	11.00 to 11.50
Rails for rolling....	13.25 to 13.75
Cast iron carwheels....	12.50 to 13.00
Stove plate (foundry)....	8.00 to 8.50
Malleable cast (railroad)....	14.00 to 14.50
Cast borings (chemical)....	10.00 to 10.50
Prices per gross ton, deliv'd local foundries:	
No. 1 machry. cast.....	\$17.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size.....	15.00
No. 2 cast (radiators, cast boilers, etc.).....	14.50

Michigan Shipments of Pig Iron to Increase

DETROIT, Sept. 3.—Scheduled pig iron shipments for September indicate an increase over July or August, and furnaces serving the district have no excess iron in stock.

There have been no changes in prices of old material. With the lower automotive production, current orders have been absorbing the scrap output.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel.....	\$14.25 to \$14.75
Borings and short turnings.....	9.00 to 9.50
Long turnings.....	8.50 to 9.00
No. 1 machinery cast....	12.50 to 13.00
Automobile cast.....	13.00 to 13.50
Hydraul. comp. sheets....	14.00 to 14.50
Stove plate.....	9.00 to 9.50
New No. 1 busheling.....	12.50 to 13.00
Old No. 1 busheling.....	11.00 to 11.50
Sheet clippings.....	8.75 to 9.25
Flashings.....	13.00 to 13.50

The American Rolling Mill Co. has ordered two more 300-hp. oil-electric locomotives for use in the Ashland, Ky., plant. The units are to be duplicates of the four already in service, and are built jointly by the Ingersoll-Rand Co., General Electric Co. and the American Locomotive Co.

Philadelphia

Buying Has Slackened But Plate Mills Are Running Full—Galvanized Sheets Still Lack Firmness

PHILADELPHIA, Sept. 3.—Steel buying slackened last week, but mills are maintaining from 90 per cent to full operations. Plate mills are especially well engaged and still have considerable shipbuilding tonnage in prospect. Sheet demand is fair, but galvanized sheet prices still lack strength. Consumers of sheets are moderately active except in the radio manufacturing field, where there has apparently been a slight recession from original production programs in some instances.

Pig iron is quiet, but most of the eastern Pennsylvania basic users and large consumers of foundry iron have yet to cover their fourth quarter requirements.

The iron and steel scrap market is less active than at any time this year.

Pig Iron.—Withdrawal of the Republic Iron & Steel Co. from the pig iron market is believed by some Northern furnaces to have made the purchase of Southern basic iron by eastern Pennsylvania consumers less likely, as this interest has been offering basic with a lower phosphorus and higher manganese content than is usually produced in the Birmingham district. A user of basic at Coatesville, Pa., has inquired for 500 tons of special analysis for prompt shipment. Foundry iron buying has been light in the past week, but prices are being maintained fairly well, with small lots bringing \$21, base furnace. While some foundries have bought iron for delivery beginning in this quarter and extending into the last quarter, a considerable number have not yet inquired for fourth quarter. Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$21.26 to \$21.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.76 to 22.26
East. Pa. No. IX.....	22.26 to 22.76
Basic (del'd east. Pa.)....	19.75 to 20.25
Gray forge.....	20.00 to 20.50
Malleable.....	21.25 to 21.75
Stand. low phos. (f.o.b. N. Y. State furnace)....	22.00 to 23.00
Cop. brg. low phos. (f.o.b. furnace)....	23.50 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	24.04
Va. No. 2X, 2.25 to 2.75 sil.	24.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Bars.—Demand is still in small volume and deliveries are fairly prompt. The price is unchanged at 1.95c. a lb., Pittsburgh, or 2.27c., delivered Philadelphia.

Reinforcing Bars.—A number of small projects, each requiring less than 100 tons of reinforcing bars, are pending. Even on the small tonnages competition between billet steel and rail steel bar producers is keen. Prices are unchanged at 1.95c. to 2c. a lb., Pittsburgh, or 2.27c. to 2.32c., delivered Philadelphia, for billet steel bars. In many instances the usual extra of \$5 a ton for cutting to length is not charged by the distributor. Rail steel bars are quoted at 1.95c. a lb., Franklin, Pa., or Tonawanda, N. Y., or 2.27c., delivered Philadelphia, with no extra for cutting to length, and this price is occasionally shaded to obtain tonnage in competition with billet steel bars.

Shapes.—Operating rates of most

mills are 90 per cent or more, and deliveries range from a week to three weeks. Fabricating shops are well engaged and are bidding on some substantial tonnages for erection this fall. Prices are unchanged at 1.95c. to 2.05c., f.o.b. nearest mill to consumer, or 2.01c. to 2.11c., delivered Philadelphia.

Plates.—In most instances eastern Pennsylvania mills are operating full, and in some cases deliveries of universal plates, which have been available in a few days, have become extended to a week or more. Buying has slackened somewhat in the past week, but this is considered to have been only a temporary lull caused by the holiday. The leading interest is reported to have received an order for 15,000 tons of plates for two ships to be built for the Export Steamship Corporation by the New York Shipbuilding Co. at Camden, N. J. Another lot of 15,000 tons is still to be awarded. Prices are unchanged at 2.05c., Coatesville, or 2.15c., delivered Philadelphia.

Sheets.—Blue annealed sheet prices are firm at 2.35c., base Pittsburgh, for No. 13 gage, or 2.67c., delivered Philadelphia, and light plates, blue annealed, are 2.10c. to 2.20c., Pittsburgh, for No. 10 gage, or 2.42c. to 2.52c., delivered Philadelphia. Black sheet quotations are fairly stable at 2.85c., Pittsburgh, or 3.17c., delivered

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, $\frac{1}{4}$ -in. and heavier.....	2.70c.
Plates, $\frac{1}{2}$ -in.	2.90c.
Structural shapes.....	2.70c.
Soft steel bars, small shapes, iron bars (except bands).....	2.80c.
Round-edge iron.....	3.30c.
Round-edge steel, iron finished $1\frac{1}{2}$ x $1\frac{1}{2}$ in.	3.50c.
Round-edge steel planished.....	4.30c.
Reinforce. steel bars, sq. twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.60c.
Cold-fin. steel, sq. and flats....	4.10c.
Steel hoops.....	3.55c.
Steel bands, No. 12 to $\frac{1}{2}$ -in. inclus.	3.30c.
Spring steel.....	5.00c.
*Black sheets (No. 24).....	4.10c.
*Galvanized sheets (No. 24).....	4.85c.
Light plates, blue annealed (No. 10).....	3.25c.
Blue ann'l'd sheets (No. 13).....	3.40c.
Diam. pat. floor plates—	
$\frac{1}{4}$ -in.	5.30c.
$\frac{1}{2}$ -in.	5.50c.
Rails.....	3.20c.
Swedish iron bars.....	6.60c.

*For 50 bundles or more: 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.

+For 50 bundles or more: 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Philadelphia, but galvanized sheets range from 3.50c. a lb., Pittsburgh, or 3.82c., Philadelphia, on desirable business to 3.60c., Pittsburgh, or 3.92c., Philadelphia. Although 3.50c., Pittsburgh, is the minimum at which galvanized sheet business has been taken in eastern Pennsylvania, Southern buyers claim to have bought at 3.40c., Pittsburgh. Local consumers of sheets have not been specifying so heavily in some cases as had been expected. A radio manufacturer is reported to be producing considerably less than originally planned in this year's production program.

Imports.—In the week ended Aug. 31, 1054 tons of pig iron arrived at this port from British India and 5300 tons of chrome ore was received from British South Africa. Steel imports consisted of 28 tons of drill steel, 1 ton of strip steel, 25 tons of iron bars, 8 tons of steel rods and 10 tons of steel billets from Sweden, 4 tons of strip steel and 4 tons of steel scrap from Germany and 21 tons of steel scrap from the United Kingdom.

Old Material.—No new scrap sales of size have been made in the past week, and, with eastern Pennsylvania consumers of No. 1 heavy melting steel well stocked at present, dealers have in most cases been offering only \$16 a ton, delivered, to fill their contracts. New contracts for requirements to the end of the year are expected before long, but at present the market is decidedly inactive.

Prices per gross ton delivered consumers' yards, Philadelphia district:	
No. 1 heavy melting steel	\$16.50 to \$17.00
Scrap T rails	16.00 to 16.50
No. 2 heavy melting steel	12.50 to 14.50
No. 1 railroad wrought	16.00 to 16.50
Bundled sheets (for steel works)	11.50
Hydraulic compressed, new	14.50 to 15.50
Hydraulic compressed, old	12.00 to 12.50
Machine shop turnings (for steel works)	12.00
Heavy axle turnings (or equiv.)	14.00 to 14.50
Cast borings (for steel works and roll mill)	11.00 to 11.75
Heavy breakable cast (for steel works)	15.00
Railroad grate bars	12.00 to 12.50
Stove plate (for steel works)	12.00 to 12.50
No. 1 low phosph. hvy., 0.04% and under	22.00 to 23.00
Couplers and knuckles	19.50 to 20.50
Rolled steel wheels	19.50 to 20.50
No. 1 blast furnace scrap	10.50 to 11.00
Wrot. iron and soft steel pipes and tubes (new specific)	15.00
Shafting	19.00 to 20.00
Steel axles	23.00 to 23.50
No. 1 forge fire	14.00
Cast iron carwheels	16.50 to 17.00
No. 1 cast	16.50 to 17.00
Cast borings (for chem. plant)	14.50
Steel rails for rolling	16.50 to 17.00

Warehouse Prices, f.o.b. Cleveland

Base per lb.

Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinforced steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to $\frac{1}{4}$ in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.70c. to 3.90c.
Galvanized sheets (No. 24)	4.60c. to 4.75c.
Blue ann'td sheets (No. 10)	3.25c.
No. 9 ann'td wire, per 100 lb.	\$2.90
No. 9 gal. wire, per 100 lb.	3.35
Com. wire nails, base per keg	2.90

*Net base, including boxing and cutting to length.

Cleveland

Present Prices on Some Steel Products Extended to Fourth Quarter—Larger Automobile Buying Expected Soon

CLEVELAND, Sept. 3.—Present prices are expected to be reestablished for the fourth quarter on finished steel in about all forms except possibly on cold-rolled strip, for which makers are asking an advance of \$2 a ton. A small amount of business in steel bars has been placed for that delivery by an extension of an existing contract. A Cleveland mill is quoting the current price on plates for the coming quarter. Several sheet mills making various grades except galvanized have named present prices for the fourth quarter, but no definite announcement seems to have been made as yet on galvanized sheets. Alloy steel bars are expected to be reestablished at the 2.65c. base.

Mills that have opened their books for the coming quarter are not yet seeking contracts for that delivery, and consumers as a rule are not yet showing much interest in contracts. A considerable tonnage in automobile body sheets for the last quarter was taken during the week, but with that exception little fourth quarter business has been placed.

Specifications with some of the mills increased a little during the week, but with others were very light. August made a good showing in the volume of business in steel bars, plates and structural shapes and the tonnage entered by some of the local sales offices exceeded that of both July, this year, and August of last year.

Inquiries from some of the automobile manufacturers for sheets are now pending for the fourth quarter, and considerable business is expected to come from that source during the next 10 days.

Some of the sheet mills which had recently curtailed production increased operations this week after the holiday shutdown.

Pig Iron.—Sales by Cleveland interests fell off somewhat the past week. However, there was a slight increase in activity in the nearby Cleveland district, where a number of smaller foundries came into the market for lots up to 300 or 400 tons of foundry and malleable iron for the fourth quarter. Low prices on Southern foundry iron have brought some business in competition with Northern grades in the northern, central and southern Ohio territories, but evidently they have not resulted in any weakness in Northern iron prices. Southern foundry iron is still available at \$13.50, Birmingham, while \$14 appears to be the maximum price. Lake furnace prices are unchanged at \$18.50, Cleveland, for outside shipment and at \$19 for local delivery. For Michigan delivery, \$20 furnace is the ruling price. Shipments by some furnaces having heavy commitments with the automotive industry declined in August. However, local furnaces whose product is more generally distributed among various consuming industries shipped a little more iron in August than in July.

Prices per gross ton at Cleveland:

N'th'n fdy., sll. 1.75 to 2.25	\$19.50
S'th'n fdy., 1.75 to 2.25	\$19.50 to 20.00
Malleable	19.50
Ohio silvery, 8 per cent	28.00
Basic Valley furnace	18.50
Stand. low phosph., Valley	26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6 from Birmingham.

Bars, Plates and Shapes.—Specifi-

cations for steel bars are not expected to show much change until some of the automobile companies release orders for steel for new models, which have not yet been placed on a production basis. Bar mills still have fair backlogs. Some of the plate mills show a gain in deliveries. Inquiry in the structural field is rather light. Two inquiries have come from Toledo for sheet steel piling, one for 400 tons for the Maumee River bridge and one for 900 tons for the New York Central Railroad docks. Present prices will probably continue through the fourth quarter. A local mill is quoting steel bars rather freely at 1.90c., Cleveland, while other producers are naming 1.95c. Plates and shapes are firm at 1.95c., Pittsburgh.

Sheets.—Specifications in the automotive industry took a little spurts the past week and some business in auto body sheets are placed in the Michigan territory for the fourth quarter at the ruling 4.10c. Pittsburgh price, which several mills have named for that delivery. Some producers have reestablished prices at 2.85c., Pittsburgh, for black, 2.35c. for light gage blue annealed, 4.20c. for metal furniture sheets and 3.90c. for vitreous enameling sheets for the last quarter. Demand in this territory is rather light. Most of the mills still have good backlogs except in auto body sheets. Regular prices appear to be well maintained for current orders.

Strip Steel.—Several mills have reestablished hot-rolled strip prices for the fourth quarter at the present basis of 1.90c., Pittsburgh, for wide and 2c. for narrow material. As mills withstood sharp resistance to these prices for the third quarter from the automotive industry, they do not expect to have difficulty in maintaining them in the final quarter. Some of the mills still have good backlogs. One sizable order placed by an Ohio consumer during the week went to a Chicago mill which could make good deliveries. A real test on cold-rolled strip prices will come when consumers contract for the coming quarter. Mills recently advanced their price to 2.85c., Cleveland and Pittsburgh,

and are naming this for the last quarter. However, shipments this month will be against old 2.75c. contracts. Specifications are light and some of the mills need orders.

Iron Ore.—Iron ore shipments by water during August broke all previous monthly records. The total movement was 10,806,967 tons, compared with a previous record of 10,709,260 tons in August, 1926. The movement until Sept. 1 also broke previous records, having been 43,717,787 tons, compared with 32,517,693 tons during the corresponding period last year, or a gain of 31.4 per cent. The previous record up to Sept. 1 was 39,334,264 tons in 1918.

Wire Products.—Manufacturers' wire is still in fair demand. While 2.40c. a lb., Cleveland, is the ruling price quoted to local jobbers and for outside shipment, some of the mills are getting 2.50c. locally. Nails are in light demand and weak. They are being sold at \$2.50 a keg by one Central Western jobber.

Semi-Finished Steel.—Specifications against contracts for sheet bars, billets and slabs are lighter than recently. A local producer is still operating all of its open-hearth furnaces, but is catching up on deliveries and can now make shipments in about 10 days. The market is devoid of inquiry.

Warehouse Business.—The volume is holding up well for this season of the year. One jobber reports a gain and another a slight loss as compared with July. Prices are firm.

Coke.—The market is not active. There is a moderate demand for small lots of the better grades of Connellsburg foundry coke, which are bringing \$4.85 a net ton. Some business in Ohio by-product foundry coke for Sep-

tember shipment has been placed since the reestablishment of the \$8.25, Painesville, price.

Old Material.—Little of interest occurred in the market in the past week. While scrap is coming out more freely than recently, no apparent weakness has developed. Local mills continue to take shipments in about the same rate as during the past few weeks, but are making no additional purchases. Dealers are paying \$17 for selected No. 1 heavy melting steel for delivery to one local mill and \$15.50 for lighter material for another mill. Up to \$15 is being paid for No. 2 grade, which is slightly firmer. Short shoveling turnings are not as firm as recently. Dealers are buying blast furnace scrap against outstanding orders at quoted prices.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel	\$15.25 to \$15.50	
No. 2 heavy melting steel	14.50 to 15.00	
Compressed sheet steel	15.50 to 16.00	
Light bundled sheet stampings	12.00 to 12.50	
Drop forge flashings	13.00 to 13.25	
Machine shop turnings	9.75 to 10.25	
Short shoveling turnings	11.75 to 12.25	
No. 1 railroad wrought	13.50 to 14.00	
No. 2 railroad wrought	16.00 to 16.50	
No. 1 busheling	13.25 to 13.75	
Pipes and flues	9.00 to 9.50	
Steel axle turnings	12.50 to 13.00	

Acid Open-Hearth Grades:		
Low phos., forging crops	17.75 to 18.00	
Low phos., billet, bloom and slab crops	18.50 to 18.75	
Low phos., sheet bar crops	18.00 to 18.50	
Low phos., plate scrap	18.00 to 18.50	

Blast Furnace Grades:		
Cast iron borings	10.50 to 10.75	
Mixed borings and short turnings	10.50 to 10.75	
No. 2 busheling	10.50 to 10.75	

Cupola Grades:		
No. 1 cast	17.50 to 18.00	
Railroad grate bars	11.00 to 12.00	
Stove plate	12.00 to 12.50	
Rails under 3 ft.	18.50 to 19.00	

Miscellaneous:		
Railroad malleable	18.00 to 18.50	
Rails for rolling	16.25 to 16.50	

Co. has bought three electric locomotives from Baldwin Locomotive Works.

Humble Oil & Refining Co. has contracted for a small steam locomotive with Baldwin Locomotive Works.

Central Railroad of New Jersey has ordered 200 70-ton steel gondolas from Bethlehem Steel Co.

New York City Board of Transportation has ordered 300 steel subway cars from American Car & Foundry Co.

Sterling Coal Co. has purchased 200 mine cars from the Bethlehem Steel Co.

Bessemer & Lake Erie has ordered 25 gondolas from Greenville Steel Car Co.

Great Northern is inquiring for two electric locomotives.

American Rolling Mill Co. has ordered two 300-hp. oil-electric locomotives from American Locomotive Co., Ingersoll-Rand Co. and General Electric Co.

Western Electric Co. has bought a 300-hp. oil-electric switching locomotive from Westinghouse Electric & Mfg. Co.

Birmingham Southern is expected to buy 25 50-ton all-steel box cars.

New York, New Haven & Hartford is asking for bids on five oil-electric rail motor cars.

Winston Brothers, Cincinnati, has ordered 150 dump cars from Western Wheeled Scraper Co.

Railroad Equipment

Norfolk & Western to Buy 1000 Hopper Cars

WHILE railroads are showing some interest in buying new equipment, as evidenced by purchases of 525 cars in the past week, inquiries have been light. The Central of New Jersey has ordered 200 70-ton steel gondolas and the New York Board of Transportation 300 steel subway cars. The Fruit Growers Express has contracted for 500 underframes. The Norfolk & Western is in the market for 1000 hopper cars. The New York Central has placed an order for 35 oil-electric switching locomotives. Details of the past week's business follow:

New York Central has ordered 35 oil-electric switching locomotives from American Locomotive Co.

Virginia Iron, Coal & Coke Co. has placed an order for two small electric locomotives with Baldwin Locomotive Works.

Philadelphia & Reading Coal & Iron

Norfolk & Western will buy 1000 hopper cars.

Fruit Growers Express has ordered 500 underframes from Ryan Car Co.

St. Louis-San Francisco may come into the market for a number of 2-8-4 locomotives.

Missouri Pacific is figuring on buying 25 engines of either the 4-8-4 or the 2-8-4 type.

Chicago, Burlington & Quincy is considering the purchase of 10 engines.

Reinforcing Steel

Past Week Was Quietest of Year —Awards of 1700 Tons

WITH awards totaling only 1700 tons and with no fresh inquiries of consequence appearing, the past week was the quietest of the year. A warehouse at Hartford, Conn., which will require 650 tons, was the largest letting. Awards follow:

HARTFORD, CONN., 650 tons, warehouse, to Truscon Steel Co.

FALL RIVER, MASS., 125 tons, State bridge, to Truscon Steel Co.

CAMBRIDGE, MASS., 200 tons, school, to Concrete Steel Co.

BATTLE CREEK, MICH., 450 tons, sanitarium, to Kalman Steel Co.

GREELEY, COLO., tonnage not stated, two miles of 27-in. reinforced concrete pipe, to an unnamed bidder.

DENVER, tonnage not given, three miles of 66-in. reinforced concrete pipe, to an unnamed bidder.

ELLENBURG, WASH., 143 tons, canal project, to unnamed bidder.

LONGVIEW, WASH., 125 tons, gates for Long Bell Lumber Co., to unnamed bidder.

Larger Carnegie Beams

The Carnegie Steel Co. has announced new 33 and 36-in. Carnegie beam and girder sections, which will be available for the trade some time after Oct. 1. The sections will be rolled at the company's Homestead works. Heretofore Carnegie beams have only been made in sections up to 30 in. The new 33 in. sections will range from 125 to 260 lb. per lin. ft., and the 36 in. from 147 to 300 lb. per lin. ft.

Foundry Meeting at St. Louis

The St. Louis District Foundrymen's Club will be addressed at its monthly meeting in St. Louis on the evening of Sept. 13 by Dr. Richard Moldenke, Watchung, N. J. Invitations have been issued to foundrymen in neighboring cities.

MacFarland & Little, Philadelphia, steel mill agents for tool steels, drawn steel, drill rods, etc., have moved their offices and warehouse from Arch Street to 1121 Frankford Avenue. William J. MacFarland and Joseph V. Little have been partners in this firm for 47 years. For the past 33 years they have been exclusive agents in the Philadelphia district for the Firth-Sterling Steel Co., McKeesport, Pa.

Pacific Coast

Structural Steel Awards Nearly 10,000 Tons Including 7000 Tons for Portland, Ore., Bridge

SAN FRANCISCO, Aug. 31 (*By Air Mail*).—The structural steel market was active during the past week on the Pacific Coast, and close to 10,000 tons was placed. Demand otherwise continues to reflect the usual mid-summer lull, the majority of inquiries and sales being confined to relatively small lots. Plate fabricators are keenly interested in the outcome of the Everett, Wash., pipe line project, involving 10,000 tons of plates. Alternate bids were taken on wood and reinforced concrete pipe. Bids have been opened on a quantity of track material, including 550 tons of girder rails for the Municipal Railroad, San Francisco. The price structure continues on an even keel, with little or no shading.

Pig Iron.—Movement of foundry pig iron is in small lots. No change in prices has occurred.

Prices per gross ton at San Francisco:	
*Utah basic	\$25.00 to \$26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	25.00 to 26.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Bars.—Only two awards involving more than 100 tons of reinforcing steel bars were reported this week. Both went to unnamed interests. Pending business is not heavy. An award is expected next week on 2300 tons for a wharf in Oakland. Out-of-stock prices continue on a fairly firm basis of 2.30c., base, on carload lots and 2.60c. on less than carload lots. In the Los Angeles district prices \$2 a ton higher prevail. Merchant bar steel continues to move in small lots only and no large inquiries are current. On this class of material, 2.35c., c.i.f., is general.

Plates.—The Western Pipe & Steel Co. was low bidder on 10,000 tons for a pipe line at Everett, Wash. Action on 3000 tons for a pipe line at Bremerton, Wash., has again been postponed owing to financing delays. Prices appear to be firm at 2.35c., c.i.f. Coast ports.

Shapes.—Structural steel shape bookings were the heaviest since early in March, totaling nearly 10,000 tons. The outstanding award was 7000 tons for the St. John's Bridge at Portland, Ore., 5000 tons having been placed with the Wallace Bridge & Structural Steel Co. and 2000 tons with the United States Steel Products Co. German interests were awarded 950 tons of sheet piling for the Akli Avenue sea wall in Seattle at a price reported to be \$45 a ton, c.i.f., duty paid. The Consolidated Steel Corporation se-

cured 350 tons for a factory for the Willard Storage Battery Co., Los Angeles, and 200 tons for a factory in El Segundo, Cal. No award has yet been made on the West Garfield Street bridge, Seattle, involving 400 tons. New inquiries include 325 tons for an addition to the American Can Co. plant, San Francisco, 450 tons for a power house in San Francisco for the Pacific Gas & Electric Co., and 405

tons for a bridge over the Trinity River for the State. Prices continue on a firm basis at 2.35c., c.i.f.

Cast Iron Pipe.—S. A. Moceri took 515 tons of 6 to 12-in. Class B pipe for the improvement of McKinley Hill district, Tacoma. The United States Pipe & Foundry Co. secured 303 tons of 10-in. Class B pipe for Coquille, Ore., and the Pacific States Cast Iron Pipe Co. took 192 tons of 2-in. Class B pipe for Los Angeles. The American Cast Iron Pipe Co. was low bidder on 377 tons of 6 to 10-in. Class B pipe for Anaheim, Cal., and the R. E. Hazard Contracting Co. was low bidder on 112 tons of 4 to 8-in. Class B pipe for the improvement of Estelle Street, San Diego.

Track Material.—The United States Steel Products Co. was low bidder on 82 special layouts, 21,000 tie plates, 30 kegs of track bolts, 130 kegs of track spikes, 13,000 brace tie plates and 550 tons of 98 to 129-lb. girder rails. Its bid was \$60.75 on 450 tons of 105-lb. girder rails.

Birmingham

Pig Iron Sales Larger, Mostly for Shipment to North—Open-Hearth Operations at Low Point of Year

BIRMINGHAM, Sept. 3.—A good volume of new pig iron tonnage was booked last week for September delivery, this coming from melters who have been buying from month to month and close to current needs. Additional buying will develop during the next week or so, as a number of small melters are still not covered for September. There has been practical no activity in fourth quarter iron to date. The general run of small-lot orders continues at a fair rate. Yard stocks of Birmingham furnaces were reduced in August for the second consecutive month. All three merchant producers reported shipments larger than production, and the August decrease in stocks was greater than in July. This was largely due to shipments outside of the South. A substantial tonnage is said to have been booked in competitive markets at price concessions from \$1 to \$2 under Southern market quotations. Iron in the Southern market continues at \$14.50 base. Within the past week there were no changes in furnace operations, but during August three furnaces were blown out, two of them by merchant foundry producers. Fourteen furnaces are now in blast. The Republic Iron & Steel Co. is relining a stack blown out the middle of August and expects to have it back in operation the early part of October.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:	
No. 2 fdy., 1.75 to 2.25 sil.	\$14.50
No. 1 fdy., 2.25 to 2.75 sil.	15.00
Basic	14.50

Finished Steel.—Demand for finished products, other than rails, continues undiminished, and operations

remain at a high point. Quotations have not been changed in the past several weeks, but concessions are being made when the business justifies. On the whole, price conditions are as stable as in other markets. Fabricators of structural steel and reinforcing steel are beginning to feel the recession in building demands. Two of the larger structural steel fabricators still have some unfilled tonnage, and one, in particular, reports orders on hand for 60 days. New business is light and a curtailment in operations has started. The Ingalls Iron Works secured 220 tons of structural steel for conveyor and bins from the Tennessee Copper Co. at Copperhill, Tenn. Bar fabricators report only a general run of small orders. Open-hearth operations are at the lowest point of the year, owing to the reduction that took place at Ensley works of the Tennessee company when the rail mill was closed. Three of nine are being operated at Ensley, but seven of the eight at the Fairfield works are active. The Gulf States Steel Co. is operating all six at Alabama City.

Cast Iron Pipe.—Pressure pipe manufacturers report a general quietness, with present business largely made up of small orders. Prices remain at \$37 to \$38 a net ton, Birmingham, for 6-in. and larger diameters.

Coke.—New tonnage in foundry coke is restricted, as most of the third quarter tonnage is under contract. Shipments continue satisfactory. Prices are still \$5 for both spot and contract.

Old Material.—Steel grades are active, but cast iron grades are moving

Warehouse Prices, f.o.b. San Francisco

Base per Lb.	
Plates and struc. shapes	3.15c.
Soft steel bars	3.15c.
Small angles, $\frac{1}{4}$ -in. and over	3.15c.
Small angles, under $\frac{1}{4}$ -in.	3.55c.
Small channels and tees, $\frac{1}{4}$ -in. to $2\frac{3}{4}$ -in.	3.75c.
Spring steel, $\frac{1}{4}$ -in. and thicker	5.00c.
Black sheets (No. 24)	4.90c.
Blue ann'td sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	5.30c.
Struct. rivets, $\frac{1}{2}$ -in. and larger	5.65c.
Com. wire nails, base per keg	\$3.40
Cement c'td nails, 100 lb. keg	3.40

slowly. Prices are the same as for the past several weeks.

Prices per gross ton, deliv'd Birmingham dist., consumers' yards:

Heavy melting steel.....	\$13.00 to \$13.50
Scrap steel rails.....	14.00
Short shoveling turnings.....	9.00
Cast iron borings.....	9.00
Stove plate.....	11.50 to 12.00
Steel axles.....	21.00
Iron axles.....	23.00
No. 1 railroad wrought.....	10.00 to 10.50
Rails for rolling.....	15.50
No. 1 cast.....	13.50
Tramcar wheels.....	13.50
Cast iron carwheels.....	13.00 to 13.50
Cast iron borings, chem.....	13.50 to 14.00

Large Production of By-Product Coke

Total output of by-product coke for the 31 days of July amounted to 4,613,723 net tons, an average of 148,830 tons a day, according to the Bureau of Mines. In comparison with the June daily average of 150,319 tons, this was a decrease of 1 per cent, but in comparison with July of last year it was an increase of 18 per cent, the respective totals for these months being 4,509,564 tons and 3,911,082 tons.

There were 86 by-product plants in operation during July, and they produced 94 per cent of their capacity.

Total output of beehive coke is estimated at 600,200 tons, a decrease of 0.4 per cent when compared with 602,400 tons, the revised figure for the preceding month, but an increase of 121 per cent over July, 1928. The combined output of by-product and beehive coke was 5,213,923 tons, 2 per cent above June.

In seven months, production of by-product coke has reached 31,307,452 tons, by far the highest total on record. This is 14 per cent ahead of last year. Except for May, the July total output is the greatest ever made in one month.

E. J. Schwabach Co. and I. J. Louis & Co., commodity houses, both of 60 Beaver Street, New York, merged Aug. 31. Henceforth business will be transacted under the name of the former company. The firm holds memberships in all the principal commodity exchanges.

Warehouse Prices, f.o.b. St. Louis

Base per Lb.

Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin. rounds, shaftings, screw stock.....	3.75c.
Black sheets (No. 24).....	4.25c.
Galv. sheets (No. 24).....	5.10c.
Blue ann'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.30c.
Galv. corrug. sheets.....	5.15c.
Structural rivets.....	3.95c.
Boiler rivets.....	3.95c.
Per Cent Off List	
Tank rivets, $\frac{1}{2}$ -in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	60
Carriage bolts.....	60
Lag screws.....	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

St. Louis

Tone Is Firmer in Pig Iron—Scrap Scarce and Strong and Prices Are Advancing

ST. LOUIS, Sept. 3.—While current sales of pig iron are not in large volume, the market has a firmer tone. The situation has been cleared by the recent heavy sales by Southern blast furnaces, which reduced their stock piles and buttressed their backlog. Throughout this district the remainder of 1929 requirements have been pretty well covered. Advantage has been taken by melters of the competition between Northern and Southern furnaces to lay up liberal stocks at low prices. The extreme low figures of the past several weeks have disappeared, and now the lowest which can be done on No. 2 Southern hereabouts is \$13.25 to \$13.50, furnace. Sales reported in the past week total about 6000 tons, of which the St. Louis Gas & Coke Co. took 2400 tons, the rest having been divided between Alabama and Chicago district makers. August shipments exceeded those of July, also the August, 1928, total.

Prices per gross ton at St. Louis:
No. 2 fdv., sil. 1.75 to 2.25, f.o.b.
Granite City, Ill. \$19.50 to \$20.00
Malleable, f.o.b. Granite city..... 20.00
N'th'n No. 2 fdv., deliv'd St. Louis..... 22.16
Southern No. 2 fdv., deliv'd. \$16.92 to 18.92
Northern malleable, deliv'd..... 22.16
Northern basic, deliv'd..... 22.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Steel.—Small jobs, aggregating a fair tonnage, are reported by fabricators and concrete bar interests, but individual lettings are not of large size. Numerous projects are pending. The largest transaction was 450 tons of reinforcing concrete bars for the McMillan Hospital, placed with the Laclede Steel Co. Warehousemen report business satisfactory. Galvanized sheets have improved further, and the movement of tin plate is normal for the season. Prices are steady.

Coke.—Preliminary reports of by-product interests in this district indicate total August shipments in excess of those in the same month last year. Demand for foundry coke holds up well, but purchasing is on an imme-

diate requirement basis. Contracting by industrial users is in fair volume, but domestic sizes continue slow.

Old Material.—All grades of scrap iron and steel are strong, with heavy melting steel and steel specialties leading the demand. Mills are in need of material, and, while reluctant to pay the prices asked, have been forced recently to meet dealers' terms on some items. Railroad offerings have increased, but are still bringing top prices, and bidding for them is spirited. Inquiries for a number of grades have been received here from other centers, notably Chicago. Country mixed scrap is scarce, and has been advanced \$1 per ton. Malleable was marked up another 50c., and fractional advances were recorded on several other items. The following railroad lists appeared: Mobile & Ohio, 29 cars; Pennsylvania, 69,945 tons; Missouri Pacific, 170 cars; Big Four, 1150 tons; Missouri-Kansas-Texas, 3000 tons; Cotton Belt, 15 cars; Rock Island, 10 cars; Belt Railway, 11 cars, and New Orleans Great Northern, 65 tons.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel.....	\$14.75 to \$15.25
No. 2 heavy melting or shoveling steel.....	14.50 to 15.00
No. 1 locomotive tires.....	15.50 to 16.00
Miscel. stand.-sec. rails including frogs, switches and guards, cut apart.....	17.00 to 17.50
Railroad springs.....	19.50 to 20.00
Bundled sheets.....	10.50 to 11.00
No. 2 railroad wrought.....	15.00 to 15.50
No. 1 busheling.....	10.00 to 10.50
Cast iron borings and shoveling turnings.....	9.50 to 10.00
Iron rails.....	15.00 to 15.50
Rails for rolling.....	17.25 to 17.75
Machine shop turnings.....	7.00 to 7.50
Heavy turnings.....	10.00 to 10.50
Steel car axles.....	19.50 to 20.00
Iron car axles.....	26.50 to 27.00
Wrot. iron bars and trans.....	21.50 to 22.00
No. 1 railroad wrought.....	13.75 to 14.25
Steel rails, less than 3 ft.....	18.00 to 18.50
Steel angle bars.....	15.25 to 15.75
Cast iron carwheels.....	15.00 to 15.50
No. 1 machinery cast.....	15.25 to 15.75
Railroad malleable.....	16.00 to 16.50
No. 1 railroad cast.....	14.75 to 15.25
Stove plate.....	12.50 to 13.00
Agricult. malleable.....	15.25 to 15.75
Relay. rails, 60 lb. and under.....	20.50 to 23.50
Relay. rails, 70 lb. and over.....	26.50 to 29.00

Cincinnati

Pig Iron Demand Slows Up—Alabama Iron Sold at \$13 to \$14, Birmingham

CINCINNATI, Sept. 3.—District consumers of pig iron continue reluctant to enter the market for sizable quantities of iron. Sales last week declined sharply from the level of the preceding week. Most furnaces are marking time, taking small orders and awaiting the renewed interest of buyers, when fourth quarter requirements force them into the market. Total sales last week were about 4000 tons, compared with 6000 the preced-

ing week. Of this tonnage, 1200 tons, in small lots, was placed with Southern furnaces at about \$14, base, Birmingham. A Tennessee furnace which heretofore had accepted orders on a basis of \$13.50, Birmingham, refused a fair tonnage at this quotation, and notified its selling agent that no more iron would be sold at less than \$14, base, Birmingham, for delivery into this district. Heretofore, Southern furnaces have maintained quotations

at \$14 for Cincinnati delivery, although tonnage orders and business outside the metropolitan area were taken at \$13.50 and in a few instances at \$13. Except for an inquiry from a Louisville, Ky., consumer for 600 tons of Southern foundry, there is no pending business before the trade.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	\$19.89 to \$20.39
Ala. fdy., sil. 1.75 to 2.25	17.19 to 18.19
Ala. fdy., sil. 2.25 to 2.75	17.69 to 18.69
Tenn. fdy., sil. 1.75 to 2.25	17.19 to 18.19
S'th'n Ohio silvery, 8 per cent	26.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$2.69 from Birmingham.

Coke.—With most foundries covered for their fuel needs for the remainder of this quarter and in some instances through the fourth, no new business, except for occasional spot shipments, has been reported. Specifications for by-product foundry coke have tapered still more during the last week, although district foundries are reported to be busy. Prices on by-product foundry grades continue firm at about \$10.05, delivered in Cincinnati.

Old Material.—Dealers are still competing strongly for heavy melting steel and other good grades of old material, but mills are not willing to pay current prices. New business is quiet. As old contracts end, mills renew quietly for short periods.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	\$14.25 to \$14.75
Scrap rails for melting	14.25 to 14.75
Loose sheet clippings	9.00 to 9.50
Bundled sheets	11.00 to 11.50
Cast iron borings	9.25 to 9.75
Machine shop turnings	8.50 to 8.75
No. 1 busheling	10.50 to 11.00
No. 2 busheling	7.00 to 7.50
Rails for rolling	14.50 to 15.00
No. 1 locomotive tires	14.25 to 14.75
No. 2 railroad wrought	14.25 to 14.75
Short rails	18.50 to 19.00
Cast iron carwheels	12.75 to 13.25
No. 1 machinery cast	19.00 to 19.50
No. 1 railroad cast	15.25 to 15.75
Burnt cast	10.25 to 10.75
Stove plate	10.25 to 10.75
Brake shoes	10.25 to 10.75
Agricultural malleable	14.25 to 14.75
Railroad malleable	15.25 to 15.75

Finished Material.—The return of several automobile manufacturers to the district sheet market, combined with the well-sustained demand from users of specialty sheets, brought new bookings of district sheet mills to a point above capacity last week. Backlogs, which had been cut into materially during the last few weeks, again were increased. During the

early part of the week an improvement in deliveries had been noticed, but the entry of automotive manufacturers, most of whom placed rush orders, has again complicated the situation. Thus, promises of four to six weeks on blue annealed sheets and

three to four weeks on black sheets are about the earliest shipments reported, while full pickled and other special grades are still well extended. Prices in all grades, except galvanized sheets, are firm and no changes for the fourth quarter are anticipated.

Boston

Pig Iron Sales for Week Exceed 10,000 Tons—Slight Easing in Scrap Prices

BOSTON, Sept. 3.—Sales of pig iron the past week exceeded 10,000 tons, about 80 per cent of which was Southern and Mystic iron. No lots larger than 500 tons were sold to any one consumer, and practically all were for fourth quarter delivery, an indication that the small and medium-sized foundries have started an active buying movement for final 1929 requirements. A Massachusetts machinery manufacturer has yet to cover on 2000 to 3000 tons. Little change is noted in prices. While most Buffalo stacks are openly quoting \$18 a ton, base, furnace, that price has been shaded, and it is still possible to obtain iron made in that district at \$17, base furnace. Most of the Southern iron sold the past week was at \$14.50 a ton, base furnace, but at least one furnace went to \$14 rather than lose the order. Sales by the Mystic Iron Works were generally at \$20 to \$21.75 a ton, furnace, for No. 2X and No. 1X, depending on the freight rate. Some Indian iron has been bought at \$21.75 to \$22 a ton, on dock here, duty paid.

Foundry iron prices per gross ton deliv'd to most New England points:

†Buffalo, sil. 1.75 to 2.25	\$21.28 to \$22.28
†Buffalo, sil. 2.25 to 2.75	21.78 to 22.78
*Buffalo, sil. 1.75 to 2.25	21.91 to 22.91
*Buffalo, sil. 2.25 to 2.75	22.41 to 23.41
East. Penn., sil. 1.75 to 2.25	22.65 to 23.15
East. Penn., sil. 2.25 to 2.75	23.15 to 23.65
Va., sil. 1.75 to 2.25	25.21
Va., sil. 2.25 to 2.75	25.71
*Ala., sil. 1.75 to 2.25	23.61
*Ala., sil. 2.25 to 2.75	24.11
†Ala., sil. 1.75 to 2.25	19.75 to 20.25
†Ala., sil. 2.25 to 2.75	20.25 to 20.75

Freight rates: \$4.91 all rail from Buffalo, and \$4.28 rail and water; \$3.65 all rail from eastern Pennsylvania; \$5.21 all rail from Virginia; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Warehouse Business.—Consumption of warehouse products, which showed some increase late in August, is expected to improve further during the remaining four months of 1929 owing to the activity of metalworking shops. That competition for business is keen among warehouses handling domestic steels and those offering imported material is evidenced by the growing willingness to shade regular list prices. Concessions vary according to the size and desirability of the order.

Shapes and Plates.—Despite reports from other sections of the country of a tapering off in business,

local mill representatives say New England bookings are holding up well and running well ahead of last year. Deliveries on plates, while better than they were a month or two ago, are still delayed. It is estimated that consumption of standard shapes in New England the last quarter of 1929 will nearly double that for the corresponding period last year. For attractive tonnages, 1.90c. a lb. can still be done, but 1.95c. is the general asking price. A local fabricator has closed on 3000 tons of steel for a Boston district job. Because the work was placed without competition details are withheld.

Cast Iron Pipe.—Prospective pipe business dropped off materially the past week. Braintree, Mass., is asking bids on a round tonnage of 6-in. pipe, and Southwick, Mass., on six miles of 8 and 10-in. stock. Because of the sold-up condition of foundries on small pipe, prices are well maintained despite the dearth of prospective business, yet attractive tonnages of large pipe unquestionably can be had at concessions. Prices quoted openly on domestic pipe are: 4-in., \$46.10 to \$47.10 a ton, delivered common Boston freight rate points; 6 to 12-in., \$40.10 to \$41.10; 16 to 20-in., \$39.10. A \$3 differential is asked on Class A and gas pipe.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe cak steel	6.00c.
Rivets, structural or boiler	4.50c.
Per Cent Off List	
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinforce. bars	3.15c.
Cast steel reinforce. bars	3.00c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex.	3.85c.
Squares	4.35c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue ann'td sheets (No. 10)	3.45c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 ann'td wire, per 100 lb.	\$3.00
Corn. wire nails, base per keg	2.85
Cement ct'd nails, base 100 lb. keg	2.85
Chain, per 100 lb.	8.75
Net per 100 Ft.	
Lap-weld steel boiler tubes, 2-in.	\$16.00
4-in.	33.00
Seamless steel boiler tubes, 2-in.	17.00
4-in.	34.00

Imports and Exports. — Arrivals of foreign iron at this port during the first half of August were 973 tons of Indian and 500 tons of Dutch, a total of 1473 tons, which compares with 548 tons during the first half of July, this year, and 695 tons in the first half of August, last year. Arrivals of ore the first half of August were 6750 tons of Bona and 11,380 tons of Newfoundland, a total of 18,130 tons, as compared with 16,510 tons the first half of July, this year, and 12,583 tons the first half of August, 1928. Scrap exported to Danzig the first half of August, this year, amounted to 3180 tons.

Coke. — The by-product foundry coke situation has not changed. Specifications against last half contracts exceed expectations. The price is holding firmly at \$11 a ton, delivered within a \$3.10 freight rate zone.

Old Material. — Pre-holiday buying of scrap fell off a little, and the market for No. 1 heavy melting steel and forge flashings was a little easier, while \$10 a ton on cars, shipping point, was the general market for long bundled skeleton. Shading of prices, however, is reported as temporary, and will, it is believed, be followed by a resumption of buying at full prices owing to the continued

scarcity of most material wanted by Pennsylvania mills. Brokers say they have a considerable tonnage yet to cover. New England foundries have shown more interest in pig iron than in scrap. The market for No. 1 machinery cast is firm at \$15 to \$15.50 a ton, delivered, but \$14 to \$14.50 a ton for textile cast is maintained with difficulty owing to increasing supplies. July scrapping of textile machinery was the heaviest for any one month since records have been maintained, and a lot of machinery also was discarded in August.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$12.00 to \$12.50
Scrap T rails	11.50 to 12.00
Scrap girder rails	10.50 to 11.00
No. 1 railroad wrought	11.00 to 11.50
No. 1 yard wrought	9.00 to 9.50
Machine shop turnings	7.00 to 7.50
Cast iron borings (steel works and rolling mill)	6.50 to 6.75
Bundled skeleton, long	10.00 to 10.50
Forge flashings	10.25 to 10.50
Blast furnace borings and turnings	6.00 to 6.25
Forge scrap	9.00 to 9.25
Shafting	14.00 to 14.75
Steel car axles	18.00 to 18.50
Wrought pipe 1 in. in diameter (over 2 ft. long)	9.75 to 10.00
Rails for rolling	12.50 to 13.00
Cast iron borings, chemical	9.75 to 10.00

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$14.00 to \$14.50
No. 1 machinery cast	15.00 to 15.50
No. 2 machinery cast	13.00 to 13.25
Stove plate	11.00 to 11.50
Railroad malleable	18.00 to 18.50

ing the past month. Dealers are expecting a sizable buying movement soon. Most of the scrap immediately east of Rochester is going to Pittsburgh and Youngstown districts. A large consumer of scrap in Buffalo continues to receive two boat loads of material from Detroit each week, and is maintaining its stockpile despite heavy operation.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:

No. 1 heavy melting steel	\$17.50 to \$18.00
No. 2 heavy melting steel	14.75 to 15.00
Scrap rails	16.50 to 17.00
Hydraul. comp. sheets	14.50 to 14.75
Hand bundled sheets	12.00 to 12.50
Drop forge flashings	14.25 to 14.50
No. 1 busheling	15.50 to 16.50
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	9.00 to 9.50
No. 1 railroad wrought	13.00 to 13.50

Acid Open-Hearth Grades:

Knuckles and couplers	19.50 to 19.75
Coil and leaf springs	19.00 to 19.50
Rolled steel wheels	19.00 to 19.50
Low phos. billet and bloom ends	20.00 to 20.50

Electric Furnace Grades:

Short shov. steel turnings	12.50 to 13.00
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Blast Furnace Grades:

Short mixed borings and turnings	11.50 to 12.25
Cast iron borings	11.50 to 12.25
No. 2 busheling	10.00 to 10.50

Rolling Mill Grades:

Steel car axles	18.75 to 19.25
Iron axles	21.00 to 22.00

Cupola Grades:

No. 1 machinery cast	16.00 to 17.00
Stove plate	13.00 to 13.50
Locomotive grate bars	12.50 to 13.00
Steel rails, 3 ft. and under	19.50 to 19.75

Cast iron carwheels:

14.00 to 14.50
18.00 to 18.50
18.00 to 18.50

Malleable Grades:

Industrial	18.00 to 18.50
Railroad	18.00 to 18.50
Agricultural	18.00 to 18.50

Special Grades:

Chemical borings	12.50 to 13.50
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Buffalo

Pig Iron Inquiries Total 10,000 to 12,000 Tons — Steel Mills Operating Well — Scrap Steady and Firm

BUFFALO, Sept. 3.—Producers are interested in an aggregate of 10,000 to 12,000 tons of pig iron inquiry from various sources, principally from Eastern points. Fewer inquiries are being received from the district, most of the business here being closed through personal solicitation before reaching the inquiry stage. An inquiry from New Jersey is for 1000 to 2000 tons of foundry, and several lots of 400 or 500 tons of foundry and malleable are pending. A New England basic user is putting out feelers for a considerable tonnage, but the exact amount is not known. Producers here are adhering to a \$19.50 base for the district.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	\$19.50
No. 2X fdy., sil. 2.25 to 2.75	20.00
No. 1 fdy., sil. 2.75 to 3.25	21.00
Malleable, sil. up to 2.25	20.00
Basic	18.50
Lake Superior charcoal	27.28

Warehouse Prices, f.o.b. Buffalo

Base per Lb.

Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.95c.
Cold-fin. flats, sq. and hex.	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	\$3.60
Black wire, base per 100 lb.	3.75

Finished Iron and Steel. — All mills are maintaining high production schedules. The Donner Steel Co. was temporarily operating five open-hearth, but has now increased to seven. Little new business was placed with structural fabricators during the week, but several jobs are in prospect. Tonnage is being figured now for the new State prison at Attica, N. Y., and for a marine aerodrome for the city of Buffalo. A local maker took 180 tons of reinforcing mesh for State highways and 80 tons for a highway job at Ludlowville, N. Y.

Old Material. — The market is holding well. Demand for shipment on the last large tonnage of No. 1 heavy melting steel sold here has increased, making conditions a little more difficult for the dealers, who are paying \$17.75 for material for shipment on this order. A few sales of No. 1 machinery cast scrap have been made at \$16. Some short steel rails, railroad knuckles and couplers and rolled steel wheels have been sold at \$19.50. Sales of short shoveling turnings have been made at \$12.50 to \$13, and sales of mixed borings and turnings and of cast iron borings at \$12 to \$12.25. Strength of the outside markets is making it difficult to pick up tonnages in this district and most of the dealers are short on all material sold dur-

Canada

General Outlook Holds Much Promise

TORONTO, ONT., Sept. 3.—The general outlook in the iron and steel industry of Canada continues to hold much promise for the last quarter of this year. The production of pig iron and steel continues at a high rate. While July production figures were at about the highest point this year, the output during August was sustained.

It has just been announced that the Algoma Steel Corporation, Sault Ste. Marie, Ont., has received a new rail order from the Canadian Pacific Railway. While the actual tonnage has not been given out, it was stated that the order will keep the rail mill going for a month. This order, together with backlog, will supply enough business for the rail mill until about Dec. 1.

Pig Iron. — Slow but steady improvement features the general trend of pig iron business. New orders are mostly in small tonnages, but the total volume is fairly good. Several orders during the week called for lots up to 500 tons, and others of like size are said to be pending. Some meltters are showing interest in fourth quarter needs. Local blast furnace representatives look for considerable future

buying when books are opened for the last quarter about Sept. 15. Pig iron prices are unchanged.

Prices per gross ton:

	Delivered Toronto
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.60
No. 2 fdy., sil. 1.75 to 2.25.....	24.10
Malleable.....	24.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75.....	\$26.00
No. 2 fdy., sil. 1.75 to 2.25.....	25.50
Malleable.....	26.00
Basic.....	24.50

	Imported Iron, Montreal Warehouse
Summerlee.....	\$33.50
Caron.....	33.00

Structural Steel.—While new business is slow, the prospective demand for structural steel continues large. Bridge construction work in Ontario, Quebec and British Columbia, already announced, will call for large tonnages, and on some of this work bids are now being received.

Old Material.—Steadily improving demand features business in this market. Sales are generally in better tonnage than at any time in the past two months, and consumers are showing more interest in their present and future scrap needs. Small contracts are being placed for delivery during the next month or six weeks, and inquiries are coming out for supplies to be delivered to the end of the year. Steel scrap developed a stronger demand during the week, with a few large tonnage orders reported in the Toronto and Hamilton districts. Iron scrap sales, however, continue to be the prominent feature of the market.

Dealers' buying prices:

	Per Gross Ton	Per Net Ton
	Toronto	Montreal
Heavy melting steel.....	\$10.00	\$8.50
Rails, scrap.....	11.00	9.00
No. 1 wrought.....	10.00	12.00
Machine shop turnings.....	7.50	5.00
Boller plate.....	7.50	6.00
Heavy axle turnings.....	8.00	7.50
Cast borings.....	7.50	5.00
Steel turnings.....	7.50	6.50
Wrought pipe.....	6.00	6.00
Steel axles.....	15.00	20.00
Axles, wrought iron.....	17.00	22.00
No. 1 machinery cast.....	17.00	17.00
Stove plate.....	13.00	13.00
Standard carwheels.....	16.00	16.00
Malleable.....	13.00	13.00

Chicago - Green Bay, Wis., Rate "Not Unreasonable"

WASHINGTON, Sept. 3.—The rate of 20.5c. per 100 lb. on iron and steel articles from Chicago (and points taking the same rate) to Green Bay, Wis., is not unreasonable or otherwise unlawful, according to a proposed report of Examiner Williams A. Maidens, made public today. The examiner said, however, that the rate is not in harmony with the rate in effect from the same territory to Milwaukee.

The Chicago-Milwaukee rate is 9.5c. and was declared to be "very much depressed." The complaint against the Chicago-Green Bay rate was made by the Green Bay Association of Commerce on behalf of the Northwest Engineering Corporation and other iron and steel users.

Youngstown

Decline in Automobile Curtails Strip Mill Operations—One Sheet Producer Offering Immediate Shipments

YOUNGSTOWN, Sept. 3.—The steel industry in the Valleys faces a month of uncertainty. Incoming specifications and orders will be watched with more interest than they have been at any time this year. Local executives see nothing alarming in prospect, as steel demand may ordinarily be expected to grow stronger in September and October. But the very heavy consumption of steel in the first eight months of the year has led some to believe that the usual autumn improvement will not develop marked proportions. Such a view is undoubtedly based on the uncertainty in the automobile industry. Valley steel companies are dependent on this industry for an important share of their prosperity. Local steel consuming companies are each year taking larger proportions of the output of Youngstown mills, but the industry here must still look to outside sources of outlet in disposing of that percentage of production which enables the mills to operate at a high and consequently profitable rate.

The large output of pipe in the Valleys is nearly all shipped to distant points, and at present the prospects for this product are unusually good. Local mills have taken numerous small feeder lines for many of the larger pipe line projects placed this year. These orders have permitted comparatively high and well diversified operations in recent weeks. Local mills are taking advantage of water shipment on this material, and large tonnages of pipe are moving by rail to Ambridge and Woodlawn, Pa., where it is transferred to barge and shipped to Southern points.

Sheet backlog are gradually being used up, and one large producer has just notified the trade that it is able to make immediate shipments of all the common finishes. Others are better supplied with commitments and will be able to maintain fair operations for the greater part of the month on present tonnage. Sheet operations last week averaged about 90 per cent of capacity, but the holiday this week, coupled with slightly lower rolling schedules, will reduce this percentage about five points. Strip operations are at not more than 75 per cent of capacity and further curtailment is probable before the expected increase in automobile requirements calls for larger tonnages.

Recent price weakness in sheets has apparently been checked. On galvanized, local mills are occasionally forced to go to 3.50c., Pittsburgh, but the usual quotation is 3.60c. and some business is being taken at that figure. On black sheets, the price is steady at 2.85c., Pittsburgh, and blue annealed material is holding at 2.20c. for the No. 10 gage base and 2.35c. for the

No. 13. On wide strips, the market is fairly well represented by a 2.10c. quotation. Both hot and cold-rolled strip are established at recent prices of 1.90c. and 2c., Pittsburgh, on the hot-rolled and 2.75c., to 2.85c. on the cold-rolled.

Fourth quarter pig iron buying has not yet begun and only small and scattered inquiry for this period has developed. Consumers of basic will soon have to come into the market, but purchases are likely to be delayed as long as possible in order to figure out the turn of the market. Prices seem to be unusually firm at \$18.50, Valley, for foundry and basic iron and \$19 for malleable and Bessemer, and no advance is anticipated for fourth quarter.

The scrap market is holding its recent strength. Sales of No. 1 heavy melting steel have been made in the last week at \$19. Hydraulic compressed sheets range from \$18 to \$18.50, but recent sales have been made at the higher figure. Specialties are strong and also the lighter grades of steel, such as machine shop turnings and short shoveling steel turnings.

Rome Iron Mills Leased

The Rome Iron Mills, Inc., announce that it has leased its plant at Rome, N. Y., to the Wrought Iron Co. of America. The mill organization has been retained and the Wrought Iron Co. of America intends to continue making the same grades of iron as in the past.

The Wrought Iron Co. of America was formed by a merger of the Lebanon Iron Co., Lebanon, Pa., and the Scranton Bolt & Nut Co., Scranton, Pa.

Ohio Steel Foundry Co., Lima, Ohio, has placed a contract for the erection of a foundry building, 100 x 200 ft., at its Springfield plant. This will be equipped with an electric furnace and modern foundry equipment and will be used exclusively for the manufacture of Fahrte heat resisting alloy castings and for the company's other alloy products. These alloy castings have been produced for the past seven years in the company's electric steel foundry at Springfield. With the erection of the new foundry the manufacture of alloy castings will be segregated in a separate building and under separate supervision.

September in automobiles promises to show a total output fully equal to and probably higher than that for August, says *Automotive Industries*.

Non-Ferrous Metal Markets

One Producer Raises Copper Price to 18½c.—Sales Heavy—Lead Active—Tin Quiet

NEW YORK, Sept. 3.

Copper.—Buying turned sharply upward in the past week and reached a total of about 50,000 tons, most of which consisted of domestic sales. However, foreign bookings during August were far ahead of those in July. As the buying movement gained momentum, consumers who had been holding off for several months came into the market to protect themselves against the possible results of a situation favoring producers. The Labor Day holiday only halted activities temporarily, for this morning foreign orders alone amounted to 3500 tons. With order books well augmented, the leading producer today announced an advance of ¼c. a lb. to 18.25c., delivered in the Connecticut Valley, for electrolytic copper. Other sellers have not yet followed this lead and are continuing to quote 18c. However, they declare that they have booked about all of the tonnage they care to take at 18c. and today were refusing some business at that figure. This action naturally indicates that within a day or two the market probably will be 18.25c. Some producers are inclined to look upon the advance as a mistake, stating that it would be much better to encourage consumers to buy freely by keeping prices at the level which has prevailed for the past few months. Lake copper is moving in liberal volume and the price ranges from 18c. to 18.12½c., delivered. In most cases, bookings have been for August and September delivery.

Copper Averages.—The average price of Lake copper for August, based on daily quotations in THE IRON AGE, is 18.12½c., delivered New York. The average price of electrolytic copper is 17.75c., refinery, or 18c., delivered in the Connecticut Valley.

Tin.—The past week has been one of the quietest of the year. Sales of about 750 tons were almost exclusively for delivery in the next two months. Despite the dullness, the market has a firm undertone and prices held well until today, when spot Straits tin dropped to 45.50c., New York. The decline reflected the weakness of the situation at London, where prices were lower, with spot standard quoted at £204 10s., future standard at £208 10s., and spot

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Sept. 3	Aug. 31	Aug. 30	Aug. 29	Aug. 28
Lake copper, New York.....	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*.....	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.....	45.50	.....	46.25	46.12½	46.12½
Zinc, East St. Louis.....	6.80	6.80	6.80	6.80	6.80
Zinc, New York.....	7.15	7.15	7.15	7.15	7.15
Lead, St. Louis.....	6.55	6.55	6.55	6.55	6.55
Lead, New York.....	6.75	6.75	6.75	6.75	6.75

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

Prices on rolled non-ferrous products are unchanged from those prevailing one week ago.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products. Freight up to 15c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—

High brass	23.25c.
Copper, hot rolled.....	26.75c.
Zinc	10.25c.
Lead (full sheets).....	11.00c. to 11.25c.

Seamless Tubes—

High brass	28.25c.
Copper	29.25c.

Rods—

High brass	21.25c.
Naval brass	24.00c.

Wire—

Copper	19.87½c.
High brass	23.75c.

Copper in Rolls.....

.....	26.75c.
Brazed Brass Tubing.....	30.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	33.00c.
Tubes, base	42.00c.
Machine rods	31.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—

Base per Lb.	
High brass	
Copper, hot rolled.....	27.75c.
Copper, cold rolled, 14 oz. and heavier	30.00c.
Zinc	10.75c.
Lead, wide	11.35c.

Seamless Tubes—

Brass	28.25c.
Copper	29.25c.

Brass Rods

.....	21.25c.
Brazed Brass Tubes.....	31.00c.

New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—

High brass.....	21.12½c. to 22.12½c.
Copper, hot rolled, base sizes.....	27.75c. to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	30.00c. to 31.00c.

Seamless Tubes—

Brass	26.00c. to 27.00c.
Copper	29.12½c. to 30.12½c.

Brazed Brass Tubes.....

.....	30.87½c.
Brass Rods.....	18.87½c. to 19.87½c.

New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks	10.50c. to 11.00c.
Zinc sheets, open	11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig	48.00c. to 49.00c.
Tin, bar	50.50c. to 51.50c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	19.00c.
Zinc, slab	7.75c. to 8.25c.
Lead, American pig	7.50c. to 8.00c.
Lead, bar	9.50c. to 10.00c.
Antimony, Asiatic	11.00c. to 11.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy	24.00c. to 25.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ⅓	30.25c. to 31.25c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig	51.25c.
Tin, bar	53.25c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	18.75c.
Zinc, slab	7.75c. to 8.00c.
Lead, American pig	7.25c. to 7.50c.
Lead, bar	9.75c.
Antimony, Asiatic	16.00c.
Babbitt metal, medium grade	18.75c.
Babbitt metal, high grade	55.50c.
Solder, ½ and ⅓	31.75c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged customers after the metal has been properly prepared for their uses.

Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	14.75c. 16.25c.
Copper, hvy. and wire	14.50c. 15.75c.
Copper, light and bottoms	12.50c. 13.75c.
Brass, heavy	8.50c. 9.50c.
Brass, light	7.50c. 8.50c.
Hvy. machine composition	12.00c. 13.00c.
No. 1 yel. brass turnings	9.75c. 10.50c.
No. 1 red brass or compositions, turnings	11.25c. 12.25c.
Lead, heavy	5.25c. 5.75c.
Lead, tea	4.25c. 5.25c.
Zinc	3.50c. 4.25c.
Sheet aluminum	14.00c. 16.00c.
Cast aluminum	12.25c. 14.25c.

Straits at £208 10s. The break in London was caused by the publication of the monthly figures of the National Metal Exchange, which showed an increase in August of 2611 tons in the visible supply. The Singapore price today was £212 15s.

Lead.—Bookings in the past seven days were equal to those of the best previous week this year. Consumers in general are manifesting interest in covering their requirements for September and October. The volume of inquiries indicates that buying should be well sustained in the immediate future. Despite the strength of the market, producers are not attempting to push up prices and the leading interest in the West is quoting 6.55c., St. Louis. The largest producer is adhering strictly to 6.75c., New York, as its contract price.

Zinc.—The market is extremely weak, with consumers buying only in small quantities. Inquiries are of moderate volume, but producers do not anticipate an appreciable improvement in bookings during the coming week. Prime Western zinc is selling at 6.80c., East St. Louis.

Antimony.—Although Chinese metal is quoted at 9c. a lb., New York, duty paid, distress lots out of warehouses have been sold at as low as

8.62½c. In some cases 8.75c. is being asked, but no business is being done at that figure. The easing of the political situation in the Far East has been partially responsible for the weakness which has appeared in the local market.

Nickel.—Ingot nickel is quoted in wholesale lots at 35c. a lb., shot nickel at 36c. and cathode electrolytic nickel at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is being quoted at 23.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

Sept. 3.—Interest in non-ferrous metals continues to expand and sales for the week showed considerable improvement. Shipments against past obligation were in larger volume.

Prices per lb., in carload lots: Lake copper, 18.50c.; tin, 47.25c.; lead, 6.70c.; zinc, 6.90c.; in less-than-carload lots, antimony, 9.85c. On old metals we quote copper wire, crucible shapes and copper clips, 14c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3.25c.; pewter, No. 1, 24.50c.; tin foil, 26c.; block tin, 36c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Structural Steel Co. and 2000 tons to United States Steel Products Co.
SEATTLE, 350 tons, sheet piling, Alki Avenue sea wall, to German bidders.

VICTORIA, B. C., 350 tons, bridge over Capilano River, to Western Canada Structural Steel & Bridge Co.

TILLAMOOK, ORE., 105 tons, Nehalem River bridge, to unnamed bidder.

LOS ANGELES, 350 tons, factory for Willard Storage Battery Co., to Consolidated Steel Corporation.

EL SEGUNDO, CAL., 200 tons, factory on 114th Street, to Consolidated Steel Corporation.

PHOENIX, ARIZ., 600 tons, power house for Central Arizona Light & Power Co., to Allison Steel Co.

NIZHNI-Novgorod, RUSSIA, tonnage not stated, automobile plant for Ford Motor Co., to Austin Co., Cleveland.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

PROVIDENCE, R. I., 100 tons, United States Rubber Co. plant.

FAIRFAX FALLS, Vt., 100 tons, State bridge.

NEW YORK, 1100 tons, Western Hotel, NEW YORK CENTRAL RAILROAD, 1000 tons, work at Grand Central Terminal in New York.

BROOKLYN, 700 tons, public school No. 230,

ATTICA, N. Y., 300 tons, New York State prison.

PHILADELPHIA, 3000 tons, Market Street National Bank building.

KITCHENER, ONT., 500 tons, market building.

TORONTO, ONT., 1500 tons, technical school on Mount Pleasant Road.

PROVINCE OF QUEBEC, 500 tons, two bridges over Gatineau River at Hull and Wright for Provincial Government.

LOUISVILLE, KY., 2000 tons, office building: Holabird & Roche, architects.

CHICAGO, 10,000 tons, addition to *Chicago Tribune* plant.

INDIANA HARBOR, IND., 2400 tons, extension to Inland Steel Co. plant.

MILWAUKEE, 3000 tons, office building for Chicago & North Western.

DES MOINES, IOWA, 2400 tons, office building.

FARGO, N. D., 400 tons, highway bridge.

SPENCER BRIDGE, B. C., 2000 tons, bridge for Canadian Pacific Railroad over Nicola River.

SAN FRANCISCO, 325 tons, addition to American Can Co. plant; bids being taken.

SAN FRANCISCO, 450 tons, power house for Pacific Gas & Electric Co.; bids being taken.

SACRAMENTO, CAL., 405 tons, bridge over Trinity River, Humboldt County; bids Sept. 25.

Federal Screw Works to Acquire Cleveland Plant

Superior Screw & Bolt Mfg. Co., East 93d Street and Aetna Road, Cleveland, will be taken over by the Federal Screw Works, Detroit, as a result of negotiations which are reported to have been closed, although details are not yet available. The Superior company specializes in the manufacture of high carbon steel screws and bolts. Its officers are B. G. Tremaine, Jr., chairman; Norton T. Jones, president; C. L. Wedow, secretary, and A. E. Fox, treasurer.

Fabricated Structural Steel

Non-Industrial Projects Will Take Large Portion of Past Week's Awards and Inquiries

STRUCTURAL steel lettings, amounting to 26,000 tons, were slightly better than those of the previous week. Non-industrial projects will take almost one-half of the tonnage. Outstanding awards were 7000 tons for a highway bridge at Portland, Ore., and 3000 tons for an apartment house in New York.

Structures for non-industrial purposes also predominated the fresh inquiries which appeared during the week. Ten thousand tons will go into an addition to the *Chicago Tribune* Building and 3000 tons into an office building at Milwaukee for the Chicago & North Western Railroad. Awards follow:

SPRINGFIELD, VT., 175 tons, high school, to unnamed fabricator.

NASHUA, N. H., 100 tons, office building, to unnamed fabricator.

FALL RIVER, MASS., 100 tons, State bridge, to Boston Bridge Works, Inc.

BRANDFORD, CONN., 100 tons, foundry, to Palmer Steel Co.

STAMFORD, CONN., 600 tons, First National Bank Building, to McClintic-Marshall Co.

NEW YORK, 1700 tons, Lenox Hill Hospital, to Harris Structural Steel Co.

NEW YORK, 1000 tons, Gordon Baking Co. building in Queens, to Levering & Garrigues Co.

NEW YORK, 800 tons, Fox Film building on West Fifty-sixth Street, to Hinkle Iron Co.

NEW YORK, 3000 tons, apartment building at Seventy-first Street and Park Avenue, to Hinkle Iron Co.

NEW YORK, 1600 tons, apartment building at Riverside Drive and Seventy-seventh Street, to Easton Structural Steel Co.

NEW YORK, 600 tons, apartment building on East Seventy-ninth Street, to Harris Structural Steel Co.

MINEOLA, N. Y., 700 tons, hangars at Roosevelt Field, to Jones & Laughlin Steel Corporation.

PHILADELPHIA & READING RAILROAD, 600 tons, car shops at Wayne, Pa., to McClintic-Marshall Co.

HARRISBURG, PA., 1300 tons, Hotel Harrisburger, to McClintic-Marshall Co.

STATE OF PENNSYLVANIA, 160 tons, Erie County highway bridge, to American Bridge Co.

CHICAGO, 110 tons, building for Cushman's Sons, Inc., to New City Iron Works, local.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC, 140 tons, highway bridge, to American Bridge Co.

READING RAILROAD, 360 tons, bridge at Saint Clair, Pa., to Bethlehem Steel Co.

COPPERHILL, TENN., 250 tons, Tennessee Copper Co. conveyor and bins, to Ingalls Iron Works, Birmingham.

FINDLAY, OHIO, 210 tons, office building for Ohio Oil Co., to Massillon Bridge & Structural Co.

MINNEAPOLIS, 1700 tons, addition to Foshay Tower, to Duffin Iron Co., Chicago.

WICHITA, KAN., 750 tons, tanks, awarded to a Joliet fabricator by Winkler Engineering Corporation.

PORTLAND, ORE., 7000 tons, St. John's bridge; 5000 tons to Wallace Bridge &

PERSONAL

J. M. ROTH, chairman of the board of the Copperweld Steel Co., Glassport, Pa., has resigned after having served the company in various capacities since its founding. He is the inventor of the hot molten welding process patent on copper-welded wire and other products. He was instrumental in the founding of the company, and served as its president until 1926, when he became chairman of the board. He has been succeeded by HARRISON NESBIT, president Bank of Pittsburgh, who has been a director of the company for some time. FRANK R. FROST, president Superior Steel Corporation, Pittsburgh, has also been made a director of the Copperweld company.

OTIS L. DAVIS has joined the staff of the Brainard Steel Corporation, Warren, Ohio, in the capacity of sales engineer. Since graduating from the University of Iowa he has been with the Western Electric Co. and more recently with the Acme Steel Co., Chicago, as sales supervisor, developing special lines.

EDWIN W. ELY has been appointed chief of the Division of Simplified Practice, Department of Commerce. He had been acting chief of the division since the promotion of Ray M. Hudson to assistant director of the Bureau of Standards. Other promotions made include that of I. J. Fairchild to chief of trade standards and of Dr. A. S. McAllister to chief of the Division of Specifications.

THOMAS B. FRANK, treasurer Cincinnati Planer Co., Cincinnati, has been selected to head the New England Cost Conference to be held at Babson Park, Wellesley Hills, Mass., this week. He is a member of the board of directors of the National Association of Cost Accountants.

ADRIAN B. WEAVER has resigned from the Chicago sales force of Hickman, Williams & Co., pig iron brokers.

B. F. MOHR, assistant to the vice-president in charge of operations, Illinois Steel Co., Chicago, has returned from a two and one-half months' trip to Europe.

RALPH SCOTT, formerly sales manager of the Gardner-Denver Co., is en route to London, England, where he is to be stationed as one of the company's foreign branch managers. W. G. AGNEW, until recently sales representative for the company in Arizona, is to be in charge of the company's foreign branch at Lima, Peru. The Gardner-Denver Co. manufactures rock drills and drilling ma-

chinery, with plants in Denver, Quincy, Ill., and La Grange, Mo.

JOHN FRASER and WILLIAM ELLIS HUGHES have been made directors of A. G. Kidston & Co., Ltd., engaged in the iron, steel and machinery business in Glasgow and London.

BLAKE C. HOOPER has been appointed sales manager of the Baker Industrial Truck Division of the Baker-Raulang Co., Cleveland. His first contract with the industrial truck business was in 1916 when he became a manufacturer's representative in St. Paul. In 1921 he was



BLAKE C. HOOPER

appointed Northwest representative of the Baker-Raulang Co. For nine years prior to his entering the industrial truck field, he served in various engineering capacities for the Chicago & Alton, Illinois Central and Rock Island railroads. He will continue in active charge of the company's railroad department.

L. E. GRIFFITH has been elected to the board of directors and a vice-presidency of the Riley Stoker Corporation, Worcester, Mass. He was graduated from Lafayette College, Easton, Pa., in 1912. His sales-engineering experience included connections with the Babcock & Wilcox Co. and the United Machine & Mfg. Co. When the Riley Stoker Corporation purchased the United Machine & Mfg. Co., Mr. Griffith was president of the latter company.

WILLARD E. FREELAND, some years ago New England editor for THE IRON AGE, later professor of marketing at the Massachusetts Institute of Technology, and recently head of Freeland & Warren, Inc., engaged as consultant in organization, management, mer-

chandising and marketing, announces the formation of a new company to succeed Freeland & Warren, the name of the new company being Freeland, Wansker, Bates & Lawrence, Inc., 805 Statler Building, Boston.

MORTEN GRINDAL, who spent about a year in the United States investigating foundry apparatus and machinery, has established his own firm in Sweden as a maker of foundry equipment. He had formerly been engaged in this and allied lines in Norway. His company is the A.-B. Motala Maskiner, Motala, Sweden, and, among other things, has a type of molding machine by which the sand is packed in the flask by subjecting the mold carrier to a hammering action while the mold is under pressure. He has filed patent applications in the United States.

PROF. DR. F. KÖRBER, director of the Kaiser-Wilhelm-Institute für Eisenforschung, Düsseldorf, and Prof. Dr. Ing. E. H. SCHULZ, director of the research department of the Vereinigte Stahlwerke, Dortmund, are on a tour of inspection and study in the United States, with present headquarters at the Pennsylvania Hotel, New York.

CHARLES P. PERIN, Perin & Marshall, consulting engineers, New York, has returned from a brief visit to England.

JAMES A. FARRELL, president and chief executive officer of the United States Steel Corporation, will return to New York on the Aquitania Sept. 6 from a sojourn in France and Spain.

JAMES C. ALLEY, pig iron broker, New York, has returned from a two months' motor trip through England, Scotland, Wales and Ireland.

E. A. MERCNER, of the Philadelphia sales office of the Bethlehem Steel Co., has been appointed resident agent of a new office the company has opened in the Manufacturers' Association Building, York, Pa. J. E. MURPHY, also of the Philadelphia office, has been appointed resident agent in charge of an office opened in the Wilkes-Barre Deposit & Savings Bank Building, Wilkes-Barre, Pa.

The Orton Crane & Shovel Co. has appointed Thomas D. Crowley & Co., 8 South Michigan Avenue, Chicago, as special railroad sales representative in the United States for the Orton line of locomotive cranes, crawling - tread cranes, shovels and draglines, gantry cranes, truck cranes, and clamshell and orange-peel buckets. Mr. Crowley has been identified with the railroad industry over 25 years. In 1922 he organized his own company for handling railroad equipment.

OBITUARY

EDWARD WORCESTER, until 1922 vice-president in charge of sales, National Tube Co., died at his daughter's home in Pittsburgh on Aug. 28, aged 74 years. He was born at East Bridgewater, Mass., and began his business career with the Chapman Valve Co.



EDWARD WORCESTER

After five years he resigned to become identified with the sales department at the Chicago plant of the National Tube Co. Later he returned to Boston to take charge of sales for the Walworth Mfg. Co. In 1882 he again returned to Chicago, where he was secretary of the Crane Brothers Mfg. Co. In 1886 he became associated with the National Tube Co. at St. Louis, and a short time later was transferred to McKeesport, Pa., where he served as assistant sales manager. He was elected a vice-president of the

company in 1903, and served in that capacity until his resignation late in 1922.

JACOB SCHONFARBER, general manager Atlantic Tubing Co., Providence, R. I., for whom funeral services were held in that city Tuesday, Aug. 27, will be buried in Baltimore, his native city. He was the victim of an automobile accident Friday night, Aug. 23.

FRANKLIN REDMAN HENRY, president Majestic Mfg. Co., St. Louis, maker of cooking apparatus, died Aug. 25, aged 62 years. Before becoming affiliated with the manufacturing company he was a street railway executive in St. Louis. He was a director of the Mississippi Valley Merchants State Trust Co. In 1908 he became vice-president and general manager of the Majestic company and was made its president in 1923.

JOSEPH WOLTER, a pioneer shipbuilder in Wisconsin, died at his home in Sturgeon Bay, Wis., Aug. 23, at 72 years of age. He was president of Sturgeon Bay Shipbuilding Corporation, one of the founders of the Rievolt & Wolter Shipbuilding Corporation, Sheboygan, and of the Sheboygan Dredge & Dock Co.

HENRY A. TUTTLE, president H. A. Tuttle Mfg. Co., Stamford, Conn., which was liquidated in 1906, and later associated with the Evans Stamping & Plating Co., Taunton, Mass., and known also in the gear manufacturing industry, died Wednesday, Aug. 28, at his home in Upton, Mass. Mr. Tuttle was born in Galesburg, Ill., 66 years ago.

Lower Rail-Water Rates to Texas Proposed

Reduction of 7.5c. Per 100 Lb. Suggested in Tariffs Filed with Interstate Commerce Commission

WASHINGTON, Sept. 3.—Rail-and-water freight lines have filed schedules with the Interstate Commerce Commission proposing reduced rates from Atlantic seaboard steel mills to points in Texas.

The reduction to the so-called group 3 in Texas, which includes such points as Dallas, Denison and Corsicana, will amount to 7.5c. per 100 lb. The points of origin include Sparrows Point, Md., and steel centers in eastern Pennsylvania.

The rail-and-water lines, through their agent, W. J. Sedgman, intend to put the lower rates into operation as an offset to the low proportional rates on steel products from the Cleveland, Youngstown, Pittsburgh and Buffalo districts to Western sea-

board points, which were allowed on July 10, when the Interstate Commerce Commission decided not to suspend them despite protests from the Chicago Association of Commerce, the Youngstown Chamber of Commerce and the Bethlehem Steel Corporation.

In support of the new schedules proposed in the Sedgman tariffs, it is contended that Eastern steel mills have been deprived of some of their advantage as a result of the low proportionals, and the new rates from the Eastern points have been offered in an effort to restore, in part at least, the situation as it existed prior to July 10.

The filing of the Sedgman tariffs has brought a protest from the in-

dependent steel producers in the Chicago district, including the Acme Steel Co., Inland Steel Co., Interstate Iron & Steel Co., Clayton Mark & Co. and the Chicago Association of Commerce. Steel producers in the Chicago district, it is stated, use the all-rail routes to the Southwest, while competitors as near by as Lorain, Ohio and Cleveland are able to use the rates of the rail-and-water lines because of the low proportional rates.

The effect upon the steel consumers in Texas is to permit them, under the proportional rates and the proposed Sedgman rates from the East, to draw upon a larger area in buying their steel.

Electrochemists to Discuss Aeronautics

At the coming convention of electrochemists to be held in Pittsburgh, Sept. 19 to 21, emphasis will be placed on the close interrelation of aeronautics and electrochemistry.

W. P. Dobson and A. S. L. Barnes, engineers of the Hydro-Electric Power Commission of Toronto, Ont., will present data on the production of hydrogen by electrochemical decomposition of water. Some of the newer types of cells will take as much as 15,000 amp., producing 250 cu. ft. of hydrogen an hour.

Light Alloys for Aircraft

(Concluded from page 616)

about the same as cast iron. Its resistance to corrosion is greater than that of aluminum. With these excellent properties, beryllium has a serious fault as a structural material in that it lacks ductility. However, he believed that a ductile alloy consisting almost entirely of beryllium will eventually be developed; the task is not easy, although work has so far met with much encouragement. Light ductile alloys containing up to 60 per cent of beryllium have been made with a reported tensile strength of 80,000 lb. per sq. in. Such alloys have a density nearer to magnesium and should have a wide field of application.

For some uses it is not necessary to have an alloy that is even moderately ductile. In its unalloyed and rather brittle state beryllium could probably be used for pistons and for castings where low density would allow it to replace cast iron to advantage. There seems to be an adequate supply of beryl and the speaker believed that beryllium eventually will be produced at \$1.40 to \$2.70 per lb.

The Houston, Tex., office of the Chain Belt Co., Milwaukee, manufacturer of Rex deep well oil chains, conveyors and concrete mixers, has moved to larger quarters at 1310 Second National Bank Building. Russell G. Davis is manager.

Manganese Producers to Discuss New Processes

American Manganese Producers Association will meet at the Mayflower Hotel, Washington, Sept. 9 and 10. On the first day the meeting will listen to a report on the condition of the industry by representatives from States in which manganese occurs. On Sept. 10 the following papers describing recent developments in concentration of manganese ore will be read:

"The Bradley Process," by Wilson Bradley, president Bradley-Fitch Co.

"Flotation of Carbonate and Oxide Manganese Ores," by Will H. Coghill, superintendent, Bureau of Mines Experimental Station, Rolla, Mo.

"New Processes," by Prof. A. T. Sweet, Michigan College of Mines.

Italy to Make Magnesium, Aluminum and Alloys

A group of metallurgical industries is in process of completion in the new port of Venice, consisting of three allied electrometallurgical installations for the manufacture of magnesium-aluminum and its products, according to Consul James B. Young at Venice. The group includes an aluminum industry, a magnesium industry and one producing magnesium-aluminum and its products, working these two component metals and their alloys. The plants of this group will be adjacent to each other.

One of the primary objects of these new industries is the Italian manufacture of light metals, especially for the aircraft industry as well as for automotive, electrical and other consumption. The well-known properties of magnesium and its alloys form a demand for these metals. Magnesium-aluminum is showing the first signs of a possible future general supplanting of copper for high-tension electric power transmission lines in Italy, and the Venetian plant, not yet completed, already has a contract for wire for that purpose.

The aluminum plant of this group has been completed and in operation for some months with an output of about 3000 metric tons of aluminum a year. Production will be increased to about 6000 tons a year by the addition of five more batteries of electric furnaces. When completed it is planned

to have an approximate total output of 20,000 tons of alumina, 6000 tons of aluminum and 6000 electrodes.

The magnesium plant now in process of construction is to start with an output of about 250 tons of magnesium annually. This is to be doubled in the near future, and later development will bring a total annual output of 2000 tons.

It is the intention to reduce the dependence of Italy on foreign copper and at the same time to build up an exportation of magnesium electro-metallurgical products, as well as of aluminum and aluminum products and alloys.

Dr. Gwyer for Institute of Metals Fall Lecture

Arrangements for the Düsseldorf meeting of the Institute of Metals are now complete. Over 200 persons from ten different countries will take part. The proceedings will open on Sept. 9 with the annual autumn lecture, which will be given by Dr. A. G. C. Gwyer on "Aluminum and Its Alloys." Dr. Gwyer of Warrington, England, is a member of council of the Institute of Metals and an original member of the institute. He studied at University College (now the University of Bristol). He spent two years at the University of Göttingen, carrying out metallographic research under Prof. Tammann. In 1912 he became research metallurgist to the British Aluminum Co., Ltd., Milton, Staffordshire. He was transferred in 1915 to the Warrington Works of the same company and in 1920 was appointed chief metallurgist.

Spiegeleisen Imports Are Large This Year

Shipments of spiegeleisen from foreign makers into the United States are on a larger scale this year than for some time. To Aug. 1, this year, Government statistics show that 11,243 tons had been entered, having a valuation of \$326,910 or approximately \$29 per ton. This year's shipments, which are at the rate of 1606 tons per month, are nearly four times the receipts in 1928, which were 435 tons per month. In 1927 the imports were 621 tons per month.

Production and Shipment of Raw Materials and Finished Products

	July, 1929	June, 1929	July, 1928
Steel barrels produced (a).....	790,175	774,853	647,844
Steel barrels shipped (a).....	782,411	779,567	645,881
Steel barrels unfilled orders (b).....	1,372,697	1,548,999	1,232,412
Steel barrels produced (a), 7 months..	5,041,199		4,356,436
Babbitt metal consumed (a), lb.	5,360,711	5,927,907	4,692,825
Sheet-metal Ware: (a)			
Galvanized, shipped, dozens.....	140,096	189,098	189,218
Galvanized, shipped, value.....	\$609,487	\$748,831	\$723,086
Enameled, shipped, dozens.....	337,375	352,885	299,078
Enameled, shipped, value.....	\$1,210,568	\$1,309,747	\$1,141,195

(a) United States Department of Commerce.
(b) End of month.

Tungsten's Industrial Value—American Requirements

The enormous saving to industry which has resulted from the use of tungsten is revealed in a bulletin which has just been issued by the Commerce Department. Two uses of this metal, the bulletin points out, overshadow all others, namely, high-speed tool steel and tungsten filament used in incandescent lights. The use of tungsten in high-speed tool steel exercises an important influence upon industries of all kinds. In comparison with steels used a few years ago, high-speed tungsten tool steel has caused a five-fold increase in efficiency, has eliminated waste in time, and has saved millions of dollars annually in labor.

The use of the tungsten filament decreases the power requirement and increases the candle power of the globe. It has been estimated that, owing to the adaptation of tungsten in incandescent light, a net saving of \$240,000,000 a year has resulted.

Requirements of the United States are estimated to be about 4000 tons annually of 60 per cent tungstic trioxide concentrate, with domestic production amounting to about one-quarter of this amount. By far the greater part of the world's production comes from China, and that country may be said to dominate the world's market in tungsten. The bulk of the world production of this metal is utilized by the steel-manufacturing countries.

Graduate Courses in Metallurgy

Evening courses in engineering and chemistry, leading eventually to the master's degree, are announced by Polytechnic Institute of Brooklyn, Court and Livingston Streets, Brooklyn, N. Y. These courses are in chemistry, civil engineering, electrical engineering, mechanical engineering, mathematics, physics and engineering economics.

Two of the courses deal with metallurgy and metallography. The course in industrial metallurgy is to be given on Thursday evenings from 6:30 to 8:30. The course in non-ferrous metallography will be given on Wednesday evenings from 6:30 to 9:30, the first hour of this period being devoted to a lecture, and the remaining two hours to laboratory practice.

In celebration of the completion of extensions to its foundry, the Industrial Steel Castings Co., Toledo, Ohio, kept open house Aug. 20 and entertained guests from Chicago, Detroit, Cleveland and other cities. After luncheon in the plant the foundry was inspected by the guests. With its additions, the company has increased its molding capacity 250 per cent and its pattern department 500 per cent. This enlargement is the second in three years.

Growing Size of Airplane Industry

Approximately 25,000 people are employed directly in the manufacture of airplanes and airplane motors in the United States, according to a survey made by the Bureau of Labor Statistics, Department of Labor. It is pointed out that modern industrial development is creating an increasing amount of labor-saving machinery which is displacing men and that, therefore, the development of any new industry is of great importance in giving employment to the men displaced by improved machinery elsewhere.

Aside from manufacturing, the airplane industry gives employment to much other labor, both directly and indirectly, the bureau states. Factories and hangars must be built; pilots both for mail and commercial work must be employed; schools of instruction are coming into existence; and many mechanics and other ground employees are needed at air fields. Employment is given also, it is stated, to persons engaged in the manufacture of material, metal, wood, cloth, rubber, etc., used in planes. Moreover, airplanes also have their effects on the production, distribution and consumption of gasoline.

In an article in the August issue of *Monthly Labor Review*, the bureau said that plants manufacturing airplanes are found in 29 States, New York being the most important, with 4396 employees, followed by California, with 1605. Other States with more than 1000 persons employed in the making of airplanes are Michigan, Washington, Kansas and Ohio.

Of the 101 firms from which reports were received, 78 produced airplanes during 1928, the output being 4886 planes. The indications were said to be that the 1929 production will be much greater. Of the 23 plants engaged in making motors, 17 had some product in 1928, when 3684 motors were made in these plants. New Jersey and Connecticut were the ranking States.

Iron Ore Imports Much Heavier in July

July imports of iron ore at 301,418 gross tons were the largest since August, 1927, when 303,586 tons came in. With that exception, the July total was the largest since July, 1923, when 439,367 tons was received. While the July tonnage was only 24 per cent

greater than in June, it exceeded July, 1928, by about 65 per cent.

For the seven elapsed months a total of 1,769,154 tons has come in. This shows a gain of 21 per cent over the imports for the corresponding period of last year. Chile still leads, with a little more than half the total. The principal differences from last year include the doubling of shipments from Cuba, a great increase in those from Sweden, where a year ago a strike was in progress, and a large reduction in imports from French Africa.

Offers Free Course in Physical Chemistry

To bridge an important gap in engineering education, by making available to older men employed in the chemical industries the latest developments in chemical engineering, Cooper Union's Institute of Technology, New York, will inaugurate in the fall a free evening course in physical chemistry, thermodynamics and allied subjects.

The purpose of the course, it is explained, is to assist those men who obtained their engineering degrees, before some of the most recent discoveries and methods were taught, to supplement their experience by a complete knowledge of the best modern practice, as recommended by the foremost engineering schools.

Propose Studies on Wire Rope

All persons interested in the manufacture or use of wire rope are invited to a conference at Engineering Societies Building, New York, at 2 p. m., Sept. 13. This is the third conference on this subject to be held within six months under the auspices of the American Society of Mechanical Engineers research committee and Engineering Foundation to discuss the desirability of organizing a research committee in the United States to advance the knowledge of the properties and life of wire rope through a cooperative investigation.

The formal part of the program will consist of brief papers presented by men well informed on the many applications of wire rope in the various fields of engineering and industry. Dr. Conrad Matschoss, director Verein Deutscher Ingenieure, will be present and will tell of the studies now being conducted by the German

wire rope committee. A report, prepared by Dr. W. A. Scoble, will also be read describing the work of the Wire Ropes Committee of the Institution of Mechanical Engineers in Great Britain.

Free Course Offered by San Francisco Steel Treaters

A free course in practical metallurgy has been sponsored by the Golden Gate Chapter of the American Society for Steel Treating at San Francisco. There are to be 18 lectures covering the manufacture of steel, with particular stress upon heat treatment and specifications for various uses. A laboratory course will also be given to those qualified. This course will cover actual heat treatment, physical tests and microscopical examination of the commonly used steels.

Registrations may now be made for the course at the Humboldt Evening High School, Eighteenth and Dolores Streets, San Francisco. The chairman of the educational committee is S. R. Thurston.

Advantages of Steel-Frame Houses Pointed Out

Many advantages of steel-frame residences were revealed in a recent prize contest for that type of structure sponsored by the Connecticut Architectural League. L. R. Hammond, chairman of the contest committee, in reporting results to the American Institute of Steel Construction, Inc., stated that information obtained through the contest indicates that steel frame is the method of house construction which will most nearly permit 75 per cent of the work to be done in the factory on a basis of 312 days of work for 312 days of pay, as against 312 days of pay for 200 days of work, the present arrangement.

In addition, the steel frame provides opportunity for a quality of precision and coordination of all service installations, such as water, heat, electric power and light and ventilation, with a corresponding great reduction in cost, which seems practically impossible in older methods of house construction.

Chart on Molybdenum Steels

An attractive chart has been issued by the Climax Molybdenum Co., 61 Broadway, New York, showing the ratio of carbon steel to alloy steel production from 1921 to 1928 inclusive, with a small chart, as an insert, illustrating the approximate annual production in tons of molybdenum steel and iron for the same period. The ratio of carbon steel to alloy steel production was 15.03 to 1 in 1928 as against 23.43 to 1 in 1921. The consumption of molybdenum alloy steel is estimated to have reached 400,000 tons in 1928, as against only 150,000 tons in 1925 and about 10,000 tons in 1921.

SOURCES OF AMERICAN IMPORTS OF IRON ORE
(In Gross Tons)

	July		Seven Months Ended July	
	1929	1928	1929	1928
Canada	2,051	1,596	2,556	44,322
Cuba	68,450	11,000	388,350	190,286
Chile	140,192	102,000	912,867	817,500
Spain	18	4,300	38,231	16,203
Sweden	42,388	.....	165,470	19,614
French Africa	11,750	40,760	109,660	282,131
Other countries	36,569	23,600	152,020	81,613
Total	301,418	183,256	1,769,154	1,451,669

European Markets Show Little Activity

German Output High But Business Quiet—British Structural Material Shows Fall Revival—France Worried Over American Tariff

(By Cablegram)

LONDON, ENGLAND, Sept. 2.

DESPITE the effect of the holidays, Cleveland blast furnaces are still busy, with little foundry iron to offer for September. An early improvement in the demand is generally anticipated. Hematite is rather more firm but the price still remains below cost.

New demand for British finished steel is dull, but there is increasing demand for structural material, which is considered a favorable augury of approaching autumn revival. Mills rolling sections are quite active.

Considerably better demand has developed for tin plate and prices have advanced fully 3d. to 18s. 6d. (\$4.48) to 18s. 9d. (\$4.54) basis. Welsh steel bars have been raised officially 3s. 9d. (85c.) to £6 10s. (\$31.52) delivered. The reason is said to be the improved industrial outlook here, due to the reparations settlement at The Hague. Inquiries for tin plate are coming forward from most of the overseas consuming countries.

Brisk demand has been seen latterly for galvanized sheets, but India still is apathetic. Makers are now more comfortably placed and most of them are quoting £13 10s. (\$65.47) f.o.b. works port.

Black sheet markets are slow, but the undertone is firm on account of dearer sheet bars.

Formation of a big British steel works combine, referred to in previous cablegrams, has now been concluded in principle, it is stated, between Dorman, Long & Co., Ltd., Middlesbrough, and Bolckow, Vaughn & Co., Ltd., also at Middlesbrough. It will probably eventually take in other North East Coast firms, to form a North East Coast combine, and other developments later.

David Colville (David Colville & Sons, Ltd., Glasgow) is said to be initiating steps for a consolidation of Scottish steelworks.

Clyde shipbuilding results in August included the launching of 17 vessels, aggregating 49,000 gross register tons. The total for eight months is less than last year.

Babcock & Wilcox, Ltd., London, has purchased a 49 per cent interest

in the Polish boiler works of Zielinski, Fitzner, Gamper.

Continental markets are still rather easy, though sentiment is again tending toward optimism.

The International Wire Cartel is meeting in Luxemburg on Sept. 17, and the Irma (International Rail Maker's Association) at Vienna on Sept. 25.

German output for July was 1,200,000 (metric) tons of pig iron, 1,466,000 tons of raw steel (ingots and castings) and 1,029,000 tons of rolled steel.

Saar raw steel production in July made a new post-war record at 198,000 tons, but pig iron output was lower, at 184,000 tons.

Italian steelworks have established a central selling syndicate, after the lapse of 18 months.

German Business Quiet

Iron and Steel Output at High Level—Machinery Exports Larger Than Last Year

BERLIN, GERMANY, Aug. 19.—The improvement in business apparent in the spring has slackened and reports of the labor unions on unemployment show a slight increase in July. The number of bankruptcies is larger than a year ago. The trend of wages

is slightly upward, but the average weekly wage of skilled workers in the iron, steel and non-ferrous metal industries in July was \$12 with unskilled labor earning an average of \$9.02. These are wage-agreement rates and include the legal supple-

British and Continental European Export prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp with the £ at \$4.85

British Prices, f.o.b. United Kingdom Ports

Cleveland No. 3 foundry	£3 12½s.	to £3 13½s.	\$17.58	to \$17.82
East Coast Hematite	3 16		18.39	
Ferromanganese, export	13 10	to 14 0	65.47	to 67.90
Billets, open hearth	6 7½	to 6 10	30.92	to 31.52
Sheets bars, open hearth	6 5	to 6 10	30.31	to 31.52
Black sheets, Japanese specifications	13 0		63.05	
Tin plate, per base box	0 18½	to 0 18¾	4.48	to 4.54
Rails, 60 lb. and heavier	7 15	to 8 15	37.59	to 42.43
Steel bars, open-hearth	7 15	to 8 10	1.67	to 1.84
Beams, open-hearth	7 2½	to 7 12½	1.55	to 1.65
Channels, open-hearth	7 7½	to 7 17½	1.60	to 1.71
Angles, open-hearth	8 2½	to 8 12½	1.76	to 1.86
Ship plates, open hearth	7 12½	to 8 2½	1.66	to 1.76
Black sheets, No. 24 gage	10 5	to 10 10	2.21	to 2.27
Galvanized sheets, No. 24 gage	13 7½	to 13 10	2.89	to 2.92

Sheet bars, Thomas	4 15½	to 4 16	23.16	to 23.28
Wire rods low C., No. 5 B.W.G.	6 5	to 6 6½	30.30	to 30.61
Black sheets, No. 31 gage, Japanese	12 10	to 13 0	60.62	to 63.05
Rails, 60 lb. and heavier	6 10*		31.52	
Rails, light	6 13½		29.46	
Steel bars, merchant	5 13	to 5 14	1.24	to 1.25
Steel bars, deformed	5 12	to 5 12½	1.21	to 1.22
Beams, Thomas, British standard	5 2	to 5 6½	1.12	to 1.17
Channels, Thomas, American sections	5 14	to 5 18	1.25	to 1.27
Angles, Thomas, 4-in. and larger, over ¾ in. thick	5 5	to 5 5½	1.15	to 1.16
Angles, Thomas, 3-in.	5 12½		1.24	
Ship plates, open-hearth inspected	7 8		1.63	
Hoop and strip steel over 6-in. base	5 17	to 5 18	1.29	to 1.30
Wire, plain, No. 8 gage	7 7		1.62	
Wire, galvanized, No. 8 gage	9 7½		2.03	
Wire, barbed, 4-pt. No. 12 B.W.G.	11 12½		2.58	
Wire nails, base	7 10½		\$1.63	per keg
Wire nails, assortments, 1 to 6-in. keg	10 6½		2.23	

*Open-hearth steel, 10s. (\$2.42) per ton extra.

Continental Prices f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	f3 8s.	to £3 11½s.	\$16.49	to \$17.33
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	3 11		17.21	
Billets, Thomas	4 16	to 4 16½	23.28	to 23.39

ments paid to married workers with two children.

The vacation season and uncertainty as to the result of the reparations conference at The Hague have checked activity in the steel industry. Recently stocks of steel companies have advanced rapidly, as a result of high rates of production, large exports and general optimism over renewal of the domestic syndicates and prolongation of the International Steel Cartel. Following the announcement that the General Electric Co. in the United States will participate in the Allegemeine Electricitäts Gesellschaft in Germany, stock of the latter company has advanced from 160 to 205.

German Production High

Pig iron production in July reached a new high of 1,203,510 tons. In the first seven months of the year pig iron output was 7,772,314 tons, compared with 7,621,974 tons in the first seven months of 1928. The total production of pig iron for this year is expected to exceed the 1927 total of 13,102,528 tons, the largest post-war year. The domestic pig iron market is unchanged, but some tendency to weakness is evident in export prices.

The export market for rolled products has begun to improve following the recent period of weakness in prices and the Stahlwerksverband has advanced its export price on steel bars at £5 14s. to £5 15s. a ton (1.23c.

to 1.24c. a lb.), f.o.b. Antwerp or Hamburg. The export price of beams and certain other products has been slightly reduced. The wire market is weak. Wire rod demand is small and with the exception of some revision of prices for export to Far Eastern markets the International Wire Rod Cartel has retained the official price of £6 5s. (\$30.31) per ton.

Export business in machine tools and agricultural machinery is increasing. The Westmark Industrie Co., jointly operated by the Karl-August Huette and the Hoch und Tiefbaufirma Gruenzig, has received a 50,000,000 m. (\$11,900,000) contract to sink mines, furnish equipment and erect 1000 dwellings for miners for the Société des Charbonnages de Faulquhamont. The entire transaction will be charged to reparations account as deliveries in kind. Exports of machinery in the first half of this year totaled 304,134 tons, a monthly average of 51,000 tons, compared with an average of 44,800 tons a month in 1928.

The small automobile market is more active, with current sales about 5 per cent greater than a year ago. The motorcycle industry reports record production with 115,000 motorcycles produced in the first half of this year and a total output of 190,000 estimated for the entire year. Imports of motorcycles in the first half of this year were 5643, compared with 4377 exported.

voted to the question of larger quotas. Belgium as well as Germany has never been satisfied with the quotas. It is claimed by Rhenish-Westphalian mills that Belgian producers, to establish proof of the necessity of an increase in their quotas, are pushing production, even though present sales do not warrant present operations.

Germany Buys Swedish Ore

DÜSSELDORF, GERMANY, Aug. 21.—The Vereinigte Stahlwerke A. G. has concluded a new contract for iron ore with the Grängesberg company for delivery of Swedish ore in 1933 to 1942. In the second quarter of this year imports of iron ore were 5,029,200 tons, compared with 3,307,600 tons in the same period of 1928, when deliveries were curtailed by the strike in Sweden. The iron ore market is active and German consumers are paying 2s. (48c.) a ton more on new contracts than was paid on contracts last year. The entire German manganese ore requirements for 1930 are reported to have been covered.

African Manganese Ore Sold

Recently South African manganese ore has appeared in the European market and the South African Manganese Ore Corporation has appointed William H. Muller & Co., of The Hague, Holland, as distributors. The quality of the ore is said to be high with manganese content ranging up to 54 per cent.

Cartel Meeting to Discuss Syndicates and Quotas

BERLIN, GERMANY, Aug. 19.—The next meeting of the International Steel Cartel will be held Sept. 12, probably in Vienna, at which time it is expected that the cartel will be prolonged for a brief period to permit negotiations to settle various differences of opinion. Belgium is understood to be indifferent and somewhat opposed to the creation of selling and price-fixing syndicates for separate products. Belgian objections are based on the fact that lower production costs in Belgium permit Belgian mills to sell profitably in open competition.

Much of the discussion at the cartel meeting is expected to be de-

Tariff Proposals Stir France to Discussion

BORDEAUX, FRANCE, Aug. 15.—The United States tariff proposals have aroused considerable discussion among steel producers in France and it is generally believed that, under the proposed schedule, export of iron, steel and machinery to the United States will be practically impossible. At the same time it is suggested in many quarters that American competition in Continental markets and throughout the world will increase as production grows in excess of domestic requirements.

It is not expected that the representations of 38 nations will have any important influence on application of the new tariff and it is pointed out that, even though certain duties are not increased, they may be raised 50 per cent at a later date under the flexible provision of the tariff.

Locomotive Building Capacity Reduced

BERLIN, GERMANY, Aug. 19.—As part of the movement that has developed to reduce locomotive building capacity, the Locomotivfabrik Hohenzollern, controlled by the Haniel interests, has closed and transferred its quota in the association of locomotive builders to the Friedrich Krupp A. G. The quota of 7.85 per cent, added to the present Krupp quota, gives the latter company a total of 13.8 per cent of the German output.

It is expected that the Linke-Hofmann-Buschwerke and possibly the Allegemeine Electricitäts Gesellschaft will surrender their quotas, which will hasten the concentration of capacity. It is reported that the negotiations between the Rumanian Government and the Allegemeine company for 100 locomotives have been concluded.

Germans Sue Competitor for Price Cutting

HAMBURG, GERMANY, Aug. 19.—An unusual legal proceeding has been taken by former members of the Syndicate of Weldless Bored Tubes, which was formed in February and automatically dissolved this month. Dissolution of the syndicate was the result of one member selling tubes at prices considerably less than the established schedule of the cartel. The remaining members have now taken legal action before the Cartel Court, claiming damages from the member underselling the established market, for dissolution of the cartel and for loss of various orders. The damages claimed are in excess of the penalty provided in the cartel agreement. As such cases are frequent among the cartels, the decision of the Court is considered of great importance.

Administrative Changes in Tariff Bill

Senate Finance Committee Would Determine Competitive Level, Cost of Transportation and Labor Participation

WASHINGTON, Sept. 3.—The Senate Committee on Finance, in its majority report on the tariff bill, made public today, said that its changes of the House bill affect about 40 upward revisions of individual rates in the metal schedule and over 60 downward revisions, including items transferred to or from the free list. The plan is to report the bill tomorrow to the Senate and to take it for consideration on Thursday.

Reference was made to the fact that all duties in the steel schedule were reduced by an amount compensatory both for the transfer of manganese ore to the free list and for reductions in the rates on manganese alloys.

"Advances in research and in the development of new products since the tariff act of 1922 resulted in a more comprehensive treatment of alloys in the House bill," the report continued. "There are, however, a number of products of the rare metals which were not adequately provided for in the House bill, and a revision of a few of the rates appeared warranted. The rates on tungsten ore, alloys of silicon, and aluminum, chromium and its alloys, and cerium metal and its alloys were decreased. Reclassification of tantalum and its alloys and the addition of carbides of tungsten and molybdenum and products composed of these metals results in some instances in increases in rates.

"Nickel oxide was transferred to the free list, as were zinc dross and skimmings. A sliding scale, based on New York market prices, was introduced for antimony metal with rates designed to exercise a stabilizing influence on prices which have shown marked fluctuations during post-war years. It is thought that the present bill provides adequately for non-ferrous metals and their derivatives and that the phraseology and rate structure is sufficiently comprehensive to provide equitable rates for products most likely to be developed within the next few years."

The Senate committee modified the House bill so as to retain the existing law providing for six bipartisan commissioners. Under the present act the term of a commissioner is 12 yr. The House bill provided for terms of 7 yr. The Senate committee amendment proposes terms of 6 yr. except that in case of the first six new appointees, their terms are to be designated by the President at the time of nomination so they may expire one at the end of each of the first 6 yr. after the date of the enactment of the bill. The increase in salary of the commissioners to \$12,000, as provided in the House bill, was retained.

Describing the difficulties in administering the flexible provisions of

the tariff act which permits the President, after investigation by the Tariff Commission, to increase or decrease duties by not more than 50 per cent, the Senate committee provided for factors not included in the House bill for ascertaining whether or not the foreign and domestic articles are upon a competitive level in the domestic market.

It inserted a definition of the term "costs of transportation," not defined in the present law." The committee is of the opinion that the imported article should be allowed costs of transportation from areas of substantial production in the principal competing foreign country to the principal port of importation in the United States, and that the domestic article be allowed the costs of transportation from areas of substantial production that can reasonably be expected to ship the article to such principal port of importation."

In ascertaining the principal competing country with respect to any imported article the President is to take into consideration the quantity, value, and quality of the article imported from each competitive country and any other differences in the conditions under which the article imported from each such country competes with the like or similar competitive domestic article.

The Senate committee continues the provision in the present law and in the House bill which provides for appeal from the Customs Court of Appeals to the United States Supreme Court in suits relating to unfair methods in the import trade and left the final decision with the Customs Court.

The Senate committee continues largely the foreign basis of valuation but calls for alternative systems of American valuation in cases where United States appraisers are unable to satisfactorily determine foreign costs of value. The Senate committee also inserted an amendment requiring the commission to convert the duties named in the bill to equivalent rates on the basis of domestic value, as distinguished from American valuation, and to report to Congress. This provision looks to the eventual adoption of the United States value as the basis of fixing ad valorem rates of duties.

The Senate committee bill provides that United States value of imported merchandise shall be the price at which the imported merchandise is offered for sale in the principal market in the United States in wholesale quantities, or, if similar imported merchandise is not so offered for sale in the United States, then an estimated value, based on the price at which comparable merchandise, imported or domestic, is offered for

sale, with such adjustments as may be necessary owing to differences in the characteristics of given products.

Several requests of the American Federation of Labor were granted by the Senate committee. One was that articles designated by an American trade mark must be actually manufactured in the United States instead of in foreign countries with lower labor costs. Another was complied with when the committee added "mined or produced" to the act forbidding the importation of convict-manufactured goods. Another provision permits labor organizations, along with domestic manufacturers, to appear as a party in interest in any reappraisal proceeding and in any protest against the collector's decision.

Canadian Pig Iron Output at Peak in July

TORONTO, ONT., Sept. 3.—Production of pig iron in Canada in July amounted to 99,786 tons, according to a statement published by the Dominion Bureau of Statistics. This output was the highest recorded for the current year and marked an advance of 11 per cent over the 89,873 tons produced in June, and a gain of 5 per cent over the total of 95,422 tons made in July, 1928.

Compared with the figures for June, data for July showed an advance in the output of basic iron to 79,241 tons from 68,059 tons and a slight drop in foundry iron output to 14,779 tons from 16,252 tons; production of malleable iron was 5766 tons against 5562 tons in June.

For the seven months ended July 31 the production of pig iron in Canada was 618,343 tons, an increase of 10 per cent over the total of 563,435 tons made during the corresponding period of 1928, which in turn was 24 per cent greater than the output of 454,710 tons produced during the first seven months of 1927. This year's output included 480,999 tons of basic iron, 101,831 tons of foundry iron and 35,513 tons of malleable.

Production of ferroalloys in Canada in July totaled 7030 gross tons, an increase of 12 per cent over the June output of 6261 tons.

Output of steel ingots and direct steel castings amounted to 129,827 tons in July. This total represented an increase of 9 per cent over the output of 119,505 tons of the previous month and was 57 per cent greater than the total of 82,807 tons reported for July, 1928. Output of ingots increased to 123,248 tons from 113,341 tons and steel castings to 6579 tons from 6164 tons in June. For the seven months ended July 31, 1929, the production of steel ingots and direct steel castings was 868,669 tons, or 19 per cent more than the 731,145 tons during the first seven months of 1928, which in turn was 35 per cent over the 542,560 tons reported for the corresponding period of 1927. This year's output to date included 826,848 tons of ingots and 41,821 tons of castings.

Iron and Steel Institute to Hold Extra Meetings

In addition to the regular autumn meeting of the Iron and Steel Institute at Newcastle-upon-Tyne, England, Sept. 9 to 11, a meeting has been arranged for Tuesday, Sept. 17, in the Secondary Schools, Doncaster Road, Scunthorpe, England, by arrangement with the Lincolnshire Iron and Steel Institute. Another extra meeting will be held at the Birmingham Chamber of Commerce, Birmingham, England, Thursday evening, Sept. 26, by arrangement with the British Cast Iron Research Association. At each of these additional meetings some of the papers which are scheduled for the autumn general meeting will be repeated.

Donner Steel to Expand; Earnings Increase

Announcement has been made by the Donner Steel Co. of the acquisition of a tract of land adjoining its present plant in Buffalo as the site for a new finishing mill, details of which are temporarily withheld. The company has also purchased 30 acres of property across the street from the present plant. This tract will be used in the future for docking and switching facilities. The installation of the new mill will cost \$2,000,000.

Net income of the Donner company for the first six months of 1929 showed an increase of 227 per cent over the corresponding period in 1928 and indications are that the net income for the year will be the largest in the history of the plant.

Larger Stocks of Industrial Coal

Stocks of anthracite and bituminous coal in industrial plants in the United States and Canada on Aug. 1 are estimated by the National Association of Purchasing Agents at 32,712,000 net tons. This shows a gain of more than 4 per cent from the 31,415,000 tons on July 1 and is the largest total since May 1. It is estimated that industrial consumption during July was 35,040,000 tons, whereas United States production totaled 45,635,000 tons.

Supplies on hand are estimated as averaging 27 days' use at current rates of consumption. Steel mills

have 27 days' supplies; railroads, 19 days'; by-product coke plants, 24 days'; electric utilities and coal gas plants, 46 days' and other industries, 32 days'.

To Demonstrate Haystellite Cutting Tools

Demonstrations of Haystellite, the cast tungsten-carbide cutting alloy made by the Haynes Stellite Co., Kokomo, Ind., will be conducted in the show rooms of Strong, Carlisle & Hammond, 1392 West Third Street, Cleveland, during the week of the National Metals Exposition, to be held in Cleveland, Sept. 9-13.

Cast iron and semi-steel will be machined on a special heavy-duty high-speed lathe equipped with the Haystellite tools.

Packages Bound by Metal Tie

A metal tie binding method has been developed by the Gerrard Co., Inc., Chicago. Wire is looped around a package, threaded through the machine and the tie completed with one throw of the lever forward and backward which tensions, seals and trims the ends. It is claimed that shippers using this method are saving 30 per cent and upward in time.

Pullman Co. to Buy 18 Machine Tools

The Pullman Co. will buy the following motor-driven machine tools for Buffalo, N. Y.: 4 14-in. grinders; 1 21-in. grinder; 1 36-in. x 8 ft. planer; 1 20-in. drill press; 1 18-in. engine lathe; 1 4-ft. radial drill; 1 24-in. heavy-duty drill; 1 18-in. shaper; 1 No. 2 milling machine; 1 16-in. lathe; 1 24-in. lathe; 1 power hack saw; 1 bolt threader, 2-in.; 1 18-in. drill; 1 bench grinder.

To Make Roller Bearings

Tyson Roller Bearing Co., Canton, Ohio, has been organized with a capital stock of \$3,000,000, and it is announced it will shortly begin the erection of the first unit of a new plant. The company will manufacture a type of roller bearing designed by Frank Tyson, who will be chief engineer of the new organization.

Production and Shipment of Steel Furniture and Shelving

	July, 1929	June, 1929	July, 1928
Steel furniture, new orders (a).....	\$2,559,991	\$2,521,630 (c)	\$2,594,216
Do., shipments (a).....	2,624,552	2,573,674	2,515,482
Do., unfilled orders (a) (b).....	2,240,260	2,320,032	2,071,553
Steel shelving, new orders (a).....	939,057 (d)	958,866	713,330
Do., shipments (a).....	867,496 (e)	920,355	722,516
Do., unfilled orders (a) (b).....	999,328 (f)	934,129	705,657

(a) United States Department of Commerce.

(b) End of month.

(c) Smallest since November, 1927.

(d) Smallest since last February.

(e) Smallest since last December.

(f) Largest on record.

COMING MEETINGS

Lake Superior Mining Institute. Sept. 6 and 7. Annual meeting, Houghton Club, Houghton, Mich. A. J. Yungbluth, Ishpeming, Mich., secretary.

American Manganese Producers' Association. Sept. 9 and 10. Annual meeting, Mayflower Hotel, Washington. Harold A. Pumpelly, Metropolitan Bank Building, Washington, secretary.

American Society for Steel Treating. Sept. 9 to 13. National metals congress and exposition, Hotel Cleveland and Public Auditorium, Cleveland. W. H. Eisenman, 7016 Euclid Avenue, Cleveland, secretary.

American Institute of Mining and Metallurgical Engineers. Sept. 9 to 13. Annual meeting of Institute of Metals and iron and steel division, Hotel Cleveland, Cleveland. H. Foster Bain, 29 West Thirty-ninth Street, New York, secretary.

American Society of Mechanical Engineers. Sept. 11 to 13. Iron and steel division, Hotel Hollenden, Cleveland. Calvin W. Rice, 29 West Thirty-ninth Street, New York, secretary.

American Welding Society. Sept. 9 to 12. Fall meeting, Hotel Statler, Cleveland. M. M. Kelly, 33 West Thirty-ninth Street, New York, secretary.

Institute of Metals (British). Sept. 9 to 12. Fall meeting, Düsseldorf, Germany. G. Shaw Scott, 36 Victoria Street, London, S. W. 1, England, secretary.

Iron and Steel Institute (British). Sept. 10 to 13. Fall meeting, Newcastle-on-Tyne, England. George C. Lloyd, 28 Victoria Street, London, S. W. 1, England, secretary.

American Railway Tool Foremen's Association. Sept. 11 to 13. Annual convention, Hotel Sherman, Chicago. F. A. Armstrong, 546 West Monroe Street, Chicago, secretary.

American Electrochemical Society. Sept. 19 to 21. Fall meeting, William Penn Hotel, Pittsburgh. Colin G. Fink, Columbia University, New York, secretary.

American Refractories Institute. Sept. 24 and 25. Fall meeting with Refractories Division of the American Ceramic Society, Deshler-Wallick Hotel, Columbus, Ohio. Dorothy A. Texter, Oliver Building, Pittsburgh, secretary.

American Drop Forging Institute. Sept. 25 to 27. Fall meeting, Buckwood Inn, Shawnee-on-Delaware, Pa. C. H. Smith, president, Steel Improvement & Forge Co., Cleveland, chairman of convention committee.

Concrete Reinforcing Steel Institute. Sept. 30 to Oct. 2. Semi-annual meeting, Wawasee Hotel, Wawasee, Ind. M. A. Beeman, 2112 Tribune Tower, Chicago, secretary.

National Industrial Advertisers' Association. Sept. 30 to Oct. 2. Eighth annual convention, Gibson Hotel, Cincinnati. Benjamin H. Miller, 420 Lexington Avenue, New York, secretary.

National Machine Tool Builders' Association. Sept. 30 to Oct. 4. Second machine tool exposition, Public Auditorium, Cleveland. E. F. DuBrul, 617 Vine Street, Cleveland, manager.

National Safety Council. Sept. 30 to Oct. 4. Eighteenth annual congress, Stevens Hotel, Chicago. W. H. Cameron, 108 East Ohio Street, Chicago, managing director.

Machinery Markets and News of the Works

August Makes Unusual Showing

Tool Sales Were Little Short of July Level—General Electric Inquiring for 80 Machines

SIZABLE purchases by several important buyers and a consistently good volume of orders from miscellaneous sources raised the August level of machine tool sales to a point little short of July and within striking distance of June and May.

In view of the fact that August is usually a rather dull midsummer month, with business adversely affected by the vacation season, this is regarded as an exceptionally good showing.

Moreover, inquiries are of such substantial volume that bookings should continue at a satisfactory rate during the next few months.

Although fresh orders have tapered slightly in the past month, the delivery situation has not improved. Most of the leading machine tool builders have enough business to last out the year and deliveries extending into

1930 are now commonly quoted on a number of types of tools.

The International Harvester Co. has bought most of the special purpose tools and standard machines for its Farmall tractor plant at Rock Island, Ill., but still must buy tool room equipment.

The General Electric Co. is inquiring for about 80 machine tools, many of which are reported to be for the department developing apparatus for talking motion pictures. The list includes 20 engine lathes, 19 milling machines, five of which are of the vertical type, six hand screw machines, seven sensitive drilling machines and a variety of other types of tools.

Tool and die shops are exceptionally busy and have been steady buyers in the Chicago market. Good used tools are scarce and used tools are not looked upon as offering serious competition to new equipment.

output from 170 to 370 tons per day, reported to cost \$225,000 with equipment. Enlargements will also be made in several present plants. Robert R. Rust is president.

Brooklyn Edison Co., Pearl and Willoughby Streets, Brooklyn, is having plans drawn for six-story equipment storage and distributing building, with mechanical service and repair divisions, as well as automobile service, repair and garage department at Fourth Avenue and Third Street, to cost \$1,000,000 with equipment. Voorhees, Gmelin & Walker, 101 Park Avenue, New York, are architects.

H. J. Nurick, 44 Court Street, Brooklyn, architect, has plans for a multi-story automobile service, repair and garage building at Livonia Avenue and Barrett Street, to cost about \$100,000 with equipment.

Curtiss Airports Corporation, 27-29 West Fifty-seventh Street, New York, is planning airport at Alameda, Cal., near San Francisco, for land and seaplanes, with hangars, repair and reconditioning units, oil storage and distributing buildings and other field structures, at cost of more than \$1,000,000 with equipment.

Seal Lock Burial Vault Co., 10-208 Ninety-fifth Avenue, Richmond Hill, L.

I., will take bids for new one-story plant on Sixty-eighth Road, Forest Hills district, to cost about \$45,000 with equipment. W. J. Boegel, 185 Madison Avenue, New York, is architect.

National Container Corporation, Review Avenue, Long Island City, manufacturer of corrugated paper, cardboard and other containers, has concluded arrangements for purchase of plant and business of Hygrade Eagle Corrugated Paper Products Corporation, Hunters Point Avenue and Manley Street, Long Island City, and will consolidate with latter. Expansion program will be arranged for increased output. Purchasing company will increase capital from 110,000 to 140,000 shares of stock, no par value, portion of fund to be used for acquisition and development.

General Cable Corporation, Graybar Building, New York, has purchased plant at Kingsland Avenue and Hamilton Street, Harrison, N. J., now occupied by A-A Wire Co., manufacturer of insulated wire and cables, a unit of organization, consisting of group of eight one-story units, totaling 160,000 sq. ft. floor space, and will develop as permanent plant for above unit. Property was originally built and occupied by New Jersey Tube Works.

Standard Underground Cable Co., Seventeenth and Pike Streets, Pittsburgh, unit of General Cable Corporation, has awarded general contract to Public Service Production Co., Public Service Terminal, Newark, N. J., for two-story addition to plant at Perth Amboy, N. J., to cost about \$50,000 with equipment. Portion of Pittsburgh works will be removed to new structure.

Central Hudson Gas & Electric Corporation, 50 Market Street, Poughkeepsie, N. Y., has arranged for sale of block of stock to total about \$7,500,000, majority of proceeds to be used for expansion and improvements, including power development and transmission line construction.

Standard Oil Co. of New Jersey, 26 Broadway, New York, has taken options on tract of about 200 acres on Staten Island, with waterfront facilities, and is said to be planning construction of new storage and distributing plant to cost \$500,000 with equipment. A finishing and packing plant for petroleum products is also planned.

North Jersey District Water Supply Commission, 24 Commerce Street, Newark, will receive bids until Sept. 17, for 42 perforated copper screens and 70 galvanized steel frame shutters for Wanaque Dam water project. Morris R. Sherrerd is consulting engineer.

Eastern New Jersey Power Co., 601 Bangs Avenue, Asbury Park, N. J., has plans for two-story addition to steam-operated electric power plant at Allenhurst, N. J., to cost \$200,000 with equipment. Management, Engineering & Development Co., Electric Building, Asbury Park, is architect and engineer.

Matawan Tile Co., Matawan, N. J., manufacturer of floor and wall tile prod-

ucts, plans rebuilding of portion of plant destroyed by fire, Aug. 27, with loss reported at close to \$100,000, including equipment. Bennett K. Eskesen is president.

Western Electric Co., 195 Broadway, New York, has leased building at 225-239 Warren Street, Newark, N. J., totaling 47,000 sq. ft. floor space, and will remodel and equip for manufacture of precision equipment, including television and similar apparatus.

Public Service Electric & Gas Co., Public Service Terminal, Newark, has plans for new plant for manufacture of motor bus bodies on waterfront property at Sewaren, N. J., to cost \$100,000 with equipment. Company will also build new steam-operated electric generating plant at same location to cost \$4,000,000. Public Service Production Co., an affiliated organization, same address, will be in charge of construction work.

Philadelphia

PHILADELPHIA, Sept. 3.—Bids will be received on general contract until Sept. 15 by I. Fischman & Sons, Inc., Tenth Street and Allegheny Avenue, Philadelphia, manufacturer of soda fountain equipment, for new two and three-story plant on Erie Avenue, to occupy block front from F to G Streets, estimated to cost \$1,500,000 with machinery. Clarence E. Wunder, 1520 Locust Street, is architect.

Baker Steel Co., G and Venango Streets, Philadelphia, plans rebuilding portion of machine shop at F and Atlantic Streets, destroyed by fire Aug. 27.

Reading Co., Reading Terminal, Philadelphia, has awarded general contract to Arey-Hauser Co., Elverson Building, for one-story electric car construction and repair shop, 137 x 325 ft., with lean-to extension, 25 x 119 ft., at Nineteenth Street and Warner Avenue, Wayne Junction, to be used in connection with railroad electrification program in this district. Cost will be \$300,000 with equipment. Clark Dillenback is company architect.

E. S. Darley, 4459 Hurley Street, Philadelphia, and associates have organized Adams Foundry Co., and plan operation of local machine shop, pattern shop and foundry for manufacture of finished castings, tools, etc. James B. Clarke, 6229 Homer Street, is interested in new organization.

Pennsylvania Railroad Co., Broad Street Station, Philadelphia, has awarded contract to United Engineers & Constructors, Inc., 112 North Broad Street, for one and one-half story interlocking machine and operating building at West Philadelphia yards, estimated to cost \$50,000.

John A. Roebling's Sons Co., South Broad Street, Trenton, N. J., has begun construction of one-story addition to rope shop No. 1, 210 x 315 ft., for manufacture of wire strand and wire rope. Equipment from present building will be removed to new unit and additional machinery provided for enlarged output. Work has also been started on one-story addition to plant at Roebling, N. J., near Trenton, 200 x 500 ft., to be equipped for manufacture of copper wire. Entire expansion will cost \$125,000 with equipment.

Board of Education, Chambersburg, Pa., plans installation of manual training equipment in new senior high school at Third and Queen Streets, estimated to cost \$280,000, for which plans are being drawn by Lawrie & Green, 821 North

Third Street, Harrisburg, Pa., architects.

Pennsylvania Stamping Co., Red Lion, Pa., has taken over local one-story factory, 80 x 200 ft., formerly occupied by Red Lion Carton Co., for manufacture of patented crates and kindred products.

Board of Trustees, State Teachers' College, East Stroudsburg, Pa., C. B. Bensinger, president, State Capitol Building, Harrisburg, Pa., is having plans prepared for extensions and improvements in power plant to cost \$50,000 with equipment. Davis & Lewis, Board of Trade Building, Scranton, Pa., are architects.

Penn Jersey Metal Products Corporation, Newton Avenue and Line Street, Camden, N. J., recently incorporated for \$125,000, is now operating plant doing general machine work of jobbing character and manufacturing tools, dies and metal stampings. Company will be in market from time to time for machine tools and presses. William Fraser, Jr., is president and William N. Marshall secretary and treasurer.

New England

BOSTON, Sept. 3.—Local machine tool dealers report the past week quiet. The most important sale was five small tool room lathes to a Connecticut plant. Otherwise business was confined to single tools. An encouraging report is that a number of manufacturers who have contemplated buying equipment and who previously signified intentions of holding off until having opportunity to inspect machines at the national exhibit, now say they probably will make purchases before the show, owing to the fact that the delivery situation has not improved.

Pittsburgh Plate Glass Co., Pittsburgh, has plans for a warehouse at East Hartford, Conn., for which conveying equipment will be required.

United States Rubber Co., New York, is taking bids for a one-story, 300 x 100-ft. manufacturing unit at Providence, R. I. Purchase of motors and conveying equipment is contemplated.

Superior Spring & Mfg. Co., 373 Washington St., Hartford, Conn., has completed plans for a one-story, 14 x 28-ft., and two-story, 58 x 128-ft. manufacturing and storage plant.

Eastern Massachusetts Electric Co., 197A Washington St., Salem, Mass., is having plans made for a powerhouse, for which a crane will be bought.

The Whitin Machine Works, Whitinsville, Mass., has acquired the American Casablanca Co., manufacturer of spinning machinery, and will transfer production to its plants.

Nutmeg Crucible Steel Co., Branford, Conn., is planning construction of a one-story, 100 x 70-ft. foundry, to cost \$20,000 without equipment.

Negotiations have been completed by Anthracite Operators Conference, 120 Broadway, New York, for purchase of controlling interest in Balanstat Corporation, Springfield, Mass., manufacturer of thermostat heat control equipment. Production is now being carried on at plant of Porter-McLeod Machine Co., Hatfield, Mass., and will be continued there temporarily. Later it is proposed to build new plant to make not only heat control, but also new forced draft equipment, another specialty of Balanstat company. George D. Roberts is treasurer.

Following recent acquisition of Lamson Oil Co., Inc., Field's Point, Providence, R. I., by Richfield Oil Corporation, pur-

chasing company has plans for new local storage and distributing plant, with capacity of 260,000 gal., to cost \$65,000 with equipment. Clinton B. Lamson is president.

Atlantic Public Utilities, Inc., Park Square Building, Boston, operating electric light and power properties in Massachusetts, Maine, New Hampshire and other States, is disposing of bond issue of \$1,500,000, portion of proceeds to be used for expansion. R. W. Gilbert is president.

To provide funds for purchase of Norwalk Lock Co., Norwalk, Conn., manufacturer of locks, builders' hardware, etc., and for expansion in present facilities, Segal Lock & Hardware Co., 155 Leonard Street, New York, is arranging for increase in capital from 155,000 to 400,000 shares of stock, no par value. Increased capacity is planned.

Holo-Krome Screw Corporation, Hartford, Conn., will begin manufacture of hollow set and hollow cap screws at 80 Pliny Street, where company occupies 20,000 sq. ft. of space. Production will be 75,000 screws daily. Company will be in market regularly for chrome nickel steel. Plant will include heat treating department. W. A. Purtell is president.

South Atlantic

BALTIMORE, Sept. 3.—Baltimore & Ohio Railroad Co., Baltimore, has approved plans for a mechanical coal-handling plant at Fairmont, W. Va., to replace existing wood tipple. New unit will supply combination coal and sand service, with capacity of 300 and 100 tons of material, respectively, and will cost \$50,000 with equipment. H. A. Lane is chief engineer.

Annapolis Water Co., Annapolis, Md., will receive bids until Sept. 16 for new pumping plant and filtration works for municipal water system, estimated to cost \$100,000 with machinery. City will share in expense. W. C. Monroe, City Hall, is city engineer in charge.

Stoneleigh Stores Corporation, 810 North Charles Street, Baltimore, Albert P. Strobel, Jr., president, is completing plans for five-story automobile service, repair and garage building, with addition of three stories underground, 190 x 194 ft., at Saratoga and St. Paul Streets, to cost \$1,500,000 with equipment. William G. Nolting, Keyser Building, is architect.

Dixie Dowel Co., Winston-Salem, N. C., recently formed by R. C. Vaughn, Wachovia Bank Building, and associates with capital of \$100,000, is planning operation of local plant for manufacture of dowel pins and kindred products.

Consumers Utilities Co., Winchester, Va., is said to have plans for artificial gas plant at Harrisonburg, Va., where franchise recently was granted, to cost \$100,000 with high pressure distributing system, etc. Charles E. Stoddard is company engineer.

Smith-Douglas Co., Board of Trade Building, Norfolk, Va., has arranged for purchase of tract of about 10 acres on Bradley Road, near city limits of Danville, Va., and plans new commercial fertilizer plant to cost \$60,000 with equipment.

West Point Power Co., West Point, Ga., has secured Federal permission for new hydro-electric power development on Chattahoochee River, at point between West Point and Franklin, with capacity of 100,000 hp. Plans will be drawn by McDonald & Co., Southeastern Trust Building, Atlanta, Ga., engineers.

De la Howe State School, Willington, S. C., is planning installation of power equipment and proposes early purchase of 25-hp. steam turbo-generator and accessory equipment.

Mica Products Corporation, Martinsville, Va., recently organized with capital of \$100,000, plans extensive operation of feldspar and mica properties in Virginia and North Carolina, where the company has group of 35 mines. Grinding mills will be operated in different centers for commercial production. Executive offices will be maintained at Norfolk, Va. H. C. Field is president.

Piteairn Aviation, Inc., Land Title Building, Philadelphia, is asking bids until Sept. 10 for hangars at Candler Field, Atlanta, Ga., to include reconditioning and repair shop facilities, etc., 150 x 250 ft., to cost \$60,000 with equipment. Branch office is in Fourth National Bank Building, Atlanta, with John K. Otley in charge.

Detroit

DETROIT, Sept. 3.—Saranac Machine Co., West Main Street, Benton Harbor, Mich., has asked bids on general contract for two-story addition, to cost \$27,000 with equipment. H. W. Harper, Fidelity Building, is architect.

Airparts Tool Co., Detroit, recently organized, will take over and consolidate Wayne Tool Co., 642 Catherine Street, and H. R. Krueger & Co., 439 East Fort Street, both manufacturers of production tools, jigs, dies, etc. New company plans expansion and improvement program for increased output. Joseph W. Rothmeyer, heretofore president of Wayne company, and H. R. Krueger, head of Krueger company, will continue in charge of consolidated organization.

Packard Motor Car Co., East Grand Boulevard, Detroit, has awarded contract to W. J. C. Kaufmann, 10,610 Shoemaker Street, for superstructure for addition to power plant at East Palmer and Bellevue Avenues, to cost more than \$200,000 with equipment. Sessions Engineering Co., General Motors Building, is engineer.

Lake Orion Airport, Inc., Lake Orion, Mich., care of L. C. Anderson, Lake Orion, recently formed by Mr. Anderson and associates, plans construction of municipal airport, including hangar, repair and reconditioning shop and other field units, to cost \$60,000 with equipment.

Mechanical Handling Systems, Inc., 3454 Denton Street, Detroit, has asked bids on general contract for one-story addition to cost \$70,000 with equipment.

City Commission, Wyandotte, Mich., is considering construction of a municipal electric light and power plant.

New Orleans Fruit Co., Harrison and Water Streets, Flint, Mich., has plans for two-story cold storage and refrigerating plant to cost about \$130,000 with machinery.

Highland Park Tool Co., 15 Victor Avenue, Highland Park, Detroit, is considering one-story addition to cost \$30,000 with equipment. W. A. N. Fares is head.

Following recent purchase of plant of Field Body Corporation, Owosso, Mich., by Weatherproof Body Corporation, Corunna, Mich., new owner is planning for early operation as branch plant for manufacture of automobile bodies. An extension and improvement program to cost \$75,000 is under way. E. C. Morine is president of Weatherproof company.

Pittsburgh

PITTSBURGH, Sept. 3.—The machinery business in this district has been rather quiet in the last two weeks as this period seems to have been the height of the vacation season. However, with the Labor Day holiday past, improvement is expected and judging by the volume of inquiry before the trade the present month should be a very active one. Tools placed recently have come from scattered sources, with individual orders predominating. However, large plants in the district have been closing regularly against their quarterly lists.

More than usual interest is attached to the heavy volume of business in heavy machinery and equipment for steel mill use which is coming to makers in this district. The American Sheet & Tin Plate Co. will soon place orders for four 4-high mills to be used at its McKeesport and Mercer, Pa., works. The H-beam mill for the new structural mill of the Illinois Steel Co. at Gary, Ind., will be built by Pittsburgh interests and orders have also been placed here recently for the equipment at the Monroe, Mich., plant of the Newton Steel Co., Youngstown. The Corrigan, McKinney Steel Co., Cleveland, is also understood to have placed a new billet mill with a local builder. Equipment for a number of large installations in the immediate Pittsburgh district, which have been mentioned previously, is still pending and the Wheeling Steel Corporation has recently announced an expansion program at its Steubenville, Ohio, works which will require considerable equipment.

Westinghouse Electric & Mfg. Co., East Pittsburgh, has engaged John H. and Wilson C. Ely, 605 Broad Street, Newark, N. J., to prepare plans for new factory branch, storage and distributing plant on tract of land on Haynes Avenue, Newark, recently acquired, to cost \$500,000 with equipment.

Pittsburgh Forgings Co., First National Bank Building, Pittsburgh, with plant at Coraopolis, Pa., has concluded arrangements for merger with Riverside Forge & Machine Co., Jackson, Mich. Both plants will be continued. Edwin Hodge, Jr., president of Pittsburgh company, will occupy same position with combined organization, and G. H. Wilkins, heretofore president of Riverside company, will be treasurer.

Cooper-Bessemer Corporation, Grove City, Pa., manufacturer of Diesel and other engines, etc., plans extensions and improvements in power plant, including installation of additional equipment, to cost \$40,000.

Sylvania Products Co., Emporium, Pa., manufacturer of radio tubes and equipment, is completing new three-story addition, 80 x 200 ft., and will install equipment to give employment to about 300 additional operatives. Expansion will cost \$100,000 with machinery.

Crotty & Co., Inc., Parkersburg, W. Va., is being formed with capital of \$200,000 to take over and expand local plant and business of company of same name, manufacturer of oil well tools and equipment. James F. Alexander, Parkersburg, has secured controlling interest in company and will head new organization. Henry L. Crotty will continue as an official of company.

Buffalo

BUFFALO, Sept. 3.—Sterling Engine Co., 1250 Niagara Street, Buffalo, manufacturer of gas engines, parts, etc., is completing plans for two-story addition, to cost about \$50,000 with equipment. F. J. and W. A. Kidd, 522 East Franklin Street, are architects.

Consolidated Aircraft Corporation, 2050 Elmwood Avenue, Buffalo, is planning early removal of plant of Thomas-Morse Aircraft Corporation, Ithaca, N. Y., manufacturer of all-metal airplanes, recently acquired, to Buffalo, where new unit will be established for this branch of production, including aircraft for military service. Present capacity will be increased. Lawrence D. Bell is vice-president of purchasing company.

McCauley Metal Products, Inc., 660 Grant Street, Buffalo, has asked bids on general contract for one-story addition, portion to be used for storage and distributing service, to cost \$40,000. A. B. Meissner, 55 Tuxedo Place, is architect.

General Specialty Co., Buffalo, has been formed with capital of \$30,000 to take over and expand company of same name with local plant at 65 Carroll Street manufacturing metal goods. Edward E. Gansworth is president.

Marcellus Casket Co., Van Rensselaer Street, Syracuse, N. Y., has awarded general contract to W. J. Burns Co., Keith Theater Building, for four-story addition to cost about \$90,000 with equipment. M. L. King, Dennison Building, is architect.

Cleveland

CLEVELAND, Sept. 3.—While machine tool sales were rather light the past week the volume of business during last month was quite satisfactory considering that August is usually a dull month. Dealers' sales ran considerably under those in July. A slight spurt in orders last week by a local turret lathe manufacturer brought its August sales up close to those of July. Business during the week was well distributed among various industries and most orders were for single machines. While buying by the automotive industry continues light, a few orders came from automobile plants in the Michigan territory. Deliveries on most lines show only a slight improvement.

Plans are being drawn by Electric Products Co., 1725 Clarkstone Road, Cleveland, manufacturer of electrical equipment, for two-story addition, 80 x 100 ft., reported to cost about \$60,000 with equipment. H. M. Morse Co., 750 Prospect Street, is architect and engineer.

Youngstown Steel Door Co., Arcade Building, Cleveland, manufacturer of steel car doors, etc., is building new plant at Youngstown, Ohio, to cost \$100,000 with machinery. Company's products are now being fabricated at plant at Midland Steel Products Co., Cleveland, but all production will be concentrated at new Youngstown plant in future. Company is identified with Youngstown Sheet & Tube Co., Youngstown.

City Council, Bucyrus, Ohio, plans municipal airport, with hangar, reconditioning and repair shop and other mechanical and field units, estimated to cost about \$40,000 with equipment.

Geometric Stamping Co., 121 East 131st Street, Cleveland, is said to be planning new addition, consisting of another story

on present two-story shop, to cost \$40,000 with equipment.

National Bronze & Aluminum Foundry Co., East Eighty-eighth Street and Laisy Avenue, Cleveland, has plans for one-story foundry, 71 x 109 ft., to cost \$50,000 with equipment.

St. Louis

ST. LOUIS, Sept. 3.—St. Louis Rust Proof Co., Broadway and Poplar Street, St. Louis, has begun work on a new two-story plant unit, totaling about 13,500 sq. ft. floor space, to be equipped for chromium plating service, to cost about \$28,000 with equipment. A. C. Eckhardt is president.

Mack International Motor Truck Corporation, 2804 Pine Street, St. Louis, with headquarters at 25 Broadway, New York, has awarded a general contract to Fruin-Conlon Contracting Co., Merchants La-Clede Building, for one-story factory branch, 200 x 287 ft., with assembling and service departments, on Chouteau Street, near Jefferson Avenue, St. Louis, to cost about \$230,000 with equipment. H. E. Foster, 400 West Madison Street, Chicago, is architect and engineer.

Mexica Refractories Co., Mexico, Mo., has preliminary plans under way for new plant for manufacture of fire brick and refractory shapes, reported to cost about \$50,000 with equipment. J. B. Arthur is president.

City Council, Russellville, Ark., has approved plans for a municipal electric light and power plant, and will arrange fund at early date of \$245,000 for construction and equipment, including distributing system. W. L. Winters, Merchants Bank Building, Fort Smith, Ark., is engineer.

City Council, Little Rock, Ark., has been authorized by public vote to arrange bond issue of \$200,000 for municipal airport, including hangars, repair and reconditioning shops, oil storage and distributing building, and other field units. City engineer in charge.

Cincinnati

CINCINNATI, Sept. 3.—Demand for machine tools during August, while not up to the high level of July, was unusually good for this period of the year. Bookings during the last week, however, were in better volume than during the preceding week and added further to the large quantity of unfilled orders now on file. This steady demand throughout the summer has been substantial rather than sensational, orders generally being for one or two machines. Local builders of machine tools have maintained capacity production throughout the summer months. Despite this continued factory activity, deliveries are extended, and three to four months is about the best that can be promised. Inquiries reflect the continued healthy interest of buyers both in replacements and new equipment. While domestic business has been brisk, foreign business has been lagging. Word from two Russian commissions, which received quotations from several local manufacturers, is being awaited, but so far only requests for further information have been received.

Contract has been let by Royal Blue Bed Spring Co., 3274 Beekman Street,

Cincinnati, to H. C. Hazen Contracting Co., 2070 Reading Road, for extensions and improvements in factory unit at 2549 Cummins Street, to cost about \$38,000. W. O. Lathrop is head.

Commerce Garage Co., Chamber of Commerce Building, Cincinnati, has filed plans for a seven-story service, repair and garage building, 60 x 190 ft., on Race Street, to cost close to \$300,000 with equipment.

Eagle Engineering Co., Springfield, Ohio, manufacturer of special machinery, parts, etc., is said to be planning one-story addition on adjoining site, 160 x 180 ft., on West Main Street, reported to cost more than \$45,000 with equipment.

Aluminum Co. of America, Inc., Oliver Building, Pittsburgh, will soon break ground for a one-story addition to plant at Maryville, Tenn., 45 x 490 ft., to cost more than \$125,000 with equipment.

Advance Battery Co., 227 East Lee Street, Louisville, has begun superstructure for a new one-story addition, to cost about \$20,000 with equipment.

United Welding Co., Middletown, Ohio, has plans for a new one-story addition to cost about \$25,000 with equipment.

Quartermaster, Construction Department, Air Corps, United States Army, Wright Field, Dayton, Ohio, has plans under way for a one-story mechanical and repair shop to cost about \$250,000 with equipment.

Chicago

CHICAGO, Sept. 3.—August fell little short of July in machine tool bookings and was within striking distance of June and May. An important factor contributing to the past month's business in this district was the buying of equipment for the Farmall tractor plant of the International Harvester Co., at Rock Island, Ill. Orders for most of the special purpose tools have now been placed and purchases of standard machines are approaching completion, with the buying of tool room equipment still to be done. The purchasing program now being concluded is expected to raise the output of the Farmall plant to 200 tractors a day. In view of steadily expanding demand, it is intimated that still further expansion of capacity is now being considered.

Although there have been no other outstanding machine tool lists before the trade during the month, business from miscellaneous sources has been consistently in good volume. In some cases orders have been referred until after the impending machine tool show at Cleveland, and vacations have also been a factor in slowing up buying, but with aggregate business booked by local distributors has been far above normal for the summer season. Evidences of tapering industrial operations are not lacking, but there have been partially offsetting increases in activity also, with the consequence that the net letup has been small.

Sellers point out that the most important incentive for machine tool buying—the high cost of labor—is, to a large extent, independent of passing fluctuations in industrial activity. Metal working shops generally are alert to the necessity for cutting all possible corners to reduce their cost burden and realize that the replacement of obsolete or obsolescent

equipment is in the interests of real economy.

Used tools are no longer serious competitors of new equipment. In fact, good used tools are scarce.

Machine tool deliveries have shown slight improvement, but are still very much extended.

Business prospects for this month have been brightened by the inauguration of purchases by the Continental Motors Corporation, Muskegon, Mich., which has not been an important buyer for a considerable period. There are also indications that added business will come from automobile manufacturers in the Central West.

Tool and die shops are exceptionally busy and are consistent buyers in the Chicago market. The Western Electric Co. is farming out less work in connection with the manufacture of sound-moving picture apparatus, indicating that its own production in this field is getting into full swing.

The Rock Island is inquiring for a 5-ft. universal radial drill for delivery at Horton, Kan. Other Western railroads show little interest in machine tools except for the preparation of preliminary figures for 1930 budgets. It is still too early to estimate the probable outlays of the railroads for equipment.

A number of large lists are in prospect for public schools on the west side of Chicago, the program for one school alone calling for 50 engine lathes. No action on this equipment can be looked for, however, until the city's finances are straightened out.

Reports vary as to collections, but on the whole it appears that obligations are being met satisfactorily.

Crane builders are heavily engaged; one leading company is booked so far ahead that it is virtually out of the market.

Western Clock Co., Buffalo Street, Peru, Ill., has awarded general contract to Jobst & Sons, Lehman Building, Peoria, Ill., for four-story addition to be used for parts production and assembling, to cost \$200,000 with equipment. A. S. Goodenough is engineer.

Ora-Tone Radio Co., 1010 George Street, Chicago, manufacturer of radio equipment, plans replacement of portion of plant recently destroyed by fire with loss of \$40,000, including equipment.

Lyon Metal Products Co., Montgomery Street, Aurora, Ill., has awarded contract to Sumner-Sollitt Co., 307 North Michigan Avenue, Chicago, for one-story addition to power plant, to cost \$70,000 with equipment. Frank D. Chase, Inc., 720 North Michigan Avenue, Chicago, is architect and engineer.

Chicago Steel Tank Co., 6400 West Sixty-sixth Street, Chicago, has filed plans for one-story addition, 120 x 200 ft., designed to increase capacity about 40 per cent, particularly in connection with steel tanks for oil burner installations. Cost will be \$125,000 with equipment. Foltz & Co., 510 North Dearborn Street, are architects.

Central West Public Service Co., 117 North Thirteenth Street, Omaha, Neb., is planning enlargements in steam-operated electric generating plant at Woonsocket, S. D., including installation of equipment to double present capacity, at cost of \$90,000.

International Harvester Co. of America, Inc., 606 South Michigan Avenue, Chicago, is planning one and two-story factory branch, storage and distributing plant at Grand Forks, N. D., to cost \$60,000 with equipment. W. D. Price is construction superintendent.

City Council, Cedar Rapids, Iowa, is planning municipal airport, including hangars, repair and reconditioning shops, oil storage and distributing buildings and other units, to cost \$180,000 with equipment. A special election has been called on Sept. 12, to approve bonds to finance the project.

Board of Education, Administration Building, Denver, Colo., plans installation of manual training equipment in new high school at Mariposa Street and Forty-first Avenue, to cost \$500,000, for which plans will be drawn by T. H. Buell & Co., United States National Bank Building, architects.

Ruth Automatic Garage, Inc., 38 South Dearborn Street, Chicago, has awarded general contract to J. B. French Co., 30 North Michigan Avenue, for 28-story service, repair and garage building at 329-335 Plymouth Court, to cost \$1,000,000 with equipment. A. S. Graven, Inc., 100 North La Salle Street, is architect.

Milwaukee

MILWAUKEE, Sept. 3.—Easier tendencies have not been as marked in machine tools as had been anticipated, but some dealers report that demand has fallen off, while others find the previous high level is maintained. Inquiries for September are showing surprising volume, with more than the expected amount coming from the automotive industry. Nearby automobile manufacturers plan resumption of large production within several weeks following a pronounced lull. Leading manufacturers in almost all lines continue production at capacity. Jobbing machine shops have all the work they can handle, but tool and die makers report the decline normal at this time. Woodworking plants are experiencing a spurt of activity.

Simmons Co., New York, is starting construction of addition to plant at Kenosha, Wis., to cost at least \$100,000 for production of "Zalmite," newly perfected base for furniture metal composed of products formerly wasted. Foundations contemplate eventual erection of six-story building, but one story and basement only are to be erected at present.

Wisconsin Ornamental Iron & Bronze Co., 1665 Booth Street, Milwaukee, recently merged with General Bronze Co., Long Island City, N. Y., has let general contract to S. M. Siegel Co., 160 Ogden Avenue, Milwaukee, for one-story addition to brass foundry, 75 x 116 ft., to cost about \$40,000 with equipment. E. A. Ernest is president.

City of Sheboygan, Wis., announces low bidder for construction of buildings and structures for new municipal filtration plant is Verhulst Co., Inc., Calumet Drive, Sheboygan, at \$251,000, but equipment bids although opened have not been disclosed. Total authorized fund for plant is \$750,000. Alvord, Burdick & Crawford, Chicago, and Jerry Donahue Engineering Co., Sheboygan, are the engineers.

City Council, Chilton, Wis., has authorized sale of \$215,000 bond issue to purchase local plant of Oconto Waterworks Co. Proposed improvements include deep well pump with electric drive and standpipe at estimated cost of \$35,000 to \$38,000. Gordon & Bilot, 53 West Jackson Boulevard, Chicago, are engineers.

Royal Airways Corporation, 614 East Gorham Street, Madison, Wis., is ready

The Crane Market

INQUIRY for cranes has been light, but with Labor Day past a continuation of buying activity is expected. The United States Metals Refining Co., Cartaret, N. J., has closed on a list of fourteen overhead cranes for Canada with the Dominion Bridge Co. The New York Central Railroad is in the market for two 25-ton locomotive cranes, and the Mitsubishi Shoji Kaisha, 120 Broadway, New York, has been taking bids on one locomotive crane for export to Japan.

Among recent purchases are:

United States Metals Refining Co., Cartaret, N. J., fourteen 10-ton overhead traveling cranes for Copper Cliffs, Ont., from Dominion Bridge Co.

Foundation Co., 120 Liberty Street, New York, two 15-ton electric traveling cranes for Chicago, Milwaukee & St. Paul Railroad from Milwaukee Electric Crane & Mfg. Corporation.

Raymond Concrete Pile Co., 140 Cedar Street, New York, 30-ton locomotive crane from Ohio Locomotive Crane Co.

David Ripley & Sons and Frank W. Hopping, Newark, N. J., 7½-ton crawler crane from Browning Crane Co.

Walsh Construction Co., Syracuse, N. Y., 30-ton locomotive crane from Browning Crane Co.

C. V. Dandignac, Port Richmond, S. I., New York, 7½-ton truck crane from Browning Crane Co.

Goodman Mfg. Co., Chicago, 10-ton, 21-ft. span, 3-motor, overhead traveling crane from unnamed builder.

Illinois Steel Co., Joliet, Ill., 10-ton, 62-ft. span, 4-motor, overhead crane from Milwaukee Electric Crane & Mfg. Corporation.

Emerson Brantingham Co., Rockford, Ill., 3-ton, 3-motor, overhead crane from unnamed builder.

for bids on airplane hangar of stucco and tile on steel framework, 100 x 130 ft., including service shop, at Pennco field. E. N. Quinn is president and general manager and Flad & Moulton, Washington St., Madison, are architects.

Northern Engraving Co., LaCrosse, Wis., has let contracts to F. R. Sewalbe & Sons, LaCrosse, for addition to plant producing automobile dash boards and art metal products, one-story, 100 x 200 ft. P. M. Gellatt is president.

Indiana

INDIANAPOLIS, Sept. 3.—Following recent acquisition of Allison Engineering Co., Main and Thirteenth Streets, Indianapolis, manufacturer of gas engines, etc., by General Motors Corporation, General Motors Building, Detroit, site is being cleared preparatory to construction of new plant units, for which plans are in progress. Works will be used for production of aircraft motors. An expansion plan is to be carried out by new owner during next 12 to 18 months to cost more than \$400,000 with equipment. N. H. Gilman is president.

Edwards Iron Works, 2101 South Main Street, South Bend, Ind., has awarded general contract to Charles A. Jordan Co., 725 Wilber Street, for one-story addition, 200 x 325 ft., to cost about \$85,000 with equipment.

Warner Gear Co., Muncie, Ind., a division of Borg-Warner Corporation, manufacturer of automobile gears, etc., is completing a new one-story unit to be equipped for about 30 per cent increase in present capacity, estimated to cost about \$1,000,000 with machinery. C. S. Davis is president of parent organization.

W. W. Ahlschlager, 65 East Huron Street, Chicago, architect, has plans under way for multi-story automobile service, repair and garage building at Ohio and Illinois Streets, Indianapolis, reported to cost close to \$900,000 with equipment.

Reynolds Regulator Co., 1520 Lincoln Street, Anderson, Ind., is said to be planning one-story addition to cost about \$35,000 with equipment.

Northern Indiana Public Service Co., Hammond, Ind., is planning four-story electric-operated pumping plant at Long Beach, Ind., reported to cost more than \$75,000 with equipment. L. C. Bernard, First Trust and Savings Bank Building, Hammond, is architect; A. P. Melton, 504 Broadway, Gary, Ind., is engineer.

Gulf States

BIRMINGHAM, Sept. 3.—Houston Armature Works, Inc., Preston Avenue, Houston, Tex., is planning new one-story electrical equipment plant on site lately acquired at Broadway and Prairie Avenue, to be one-story, to cost about \$45,000 with equipment. A. C. Kater is president.

Texas-Louisiana Power Co., Fort Worth Club Building, Fort Worth, Tex., has approved plans for immediate construction of addition to steam-operated electric generating plant at Pecos, Tex., estimated to cost \$200,000 including transmission line extensions.

Galveston Wharf Co., Galveston, Tex., has filed plans for new grain elevator, 230 ft. high, with capacity of 6,000,000 bushels, to include conveying, elevating, screening and other equipment, estimated to cost \$1,500,000.

McWane Cast Iron Pipe Co., 3700 North Eleventh Avenue, Birmingham, Ala., has awarded general contract to A. F. Felix, 2119 North First Avenue, for one-story and basement addition, 40 x 100 ft., to cost about \$40,000 with equipment. Miller & Martin, Title Guarantee Building, are architects.

Southern Air Transport System, Fort Worth, Tex., has plans nearing completion for hangar at Love Field, Dallas, Tex., consisting of two bays, 110 ft. and 90 ft. respectively, with repair and reconditioning shops in rear, estimated to cost about \$85,000 with equipment.

Board of Education, Greenville, Miss., is planning installation of manual training department in new two-story E. E. Bass Junior high school, estimated to cost \$200,000, for which bids will be received on general contract on Sept. 17. N. W. Overstreet, Fire Insurance Building, Jackson, Miss., is architect.

Port of Corpus Christi, Corpus Christi, Tex., plans installation of conveying, elevating and other mechanical-handling equipment at new loading terminal, estimated to cost \$300,000, for which fund has been arranged. Structure will be occupied under lease by Duval Texas Sulphur Co., Corpus Christi.

Pacific Coast

SAN FRANCISCO, Aug. 29.—Contract has been let by Southern Pacific Railway Co., Los Angeles, to Robert McKee, 515 Hewitt Street, for group of locomotive repair shops on San Fernando Road, consisting of engine house, machine shop, 73 x 225 ft.; power house, 50 x 54 ft., and six other one-story units, to cost \$350,000 with equipment. Engineering department of company is in charge.

Los Angeles Engine Works, Inc., Los Angeles, has awarded general contract to Ted R. Cooper Co., Western Pacific Building, for one-story plant, 50 x 140 ft., on Turner Street, to cost \$50,000 with equipment.

Board of County Supervisors, Hall of Records, Los Angeles, is asking bids until Sept. 10 for a 300 kva. generator set for the Los Angeles general hospital.

Standard Auto Body Co., Fifteenth Street and Central Avenue, Los Angeles, has awarded general contract to Jergesen & DeQuine, 1316 Paloma Avenue, for one-story addition, 100 x 150 ft., to cost \$65,000 with equipment. Richard D. King, Van Nuys Building, is architect.

Charles W. Ertz, Pittock Block, Portland, Ore., architect, will soon take bids on general contract for two-story automobile service, repair and garage building, at Burnside and Thirteenth Streets, 200 x 200 ft., to cost \$150,000 with equipment.

Olympic Forest Products Co., Port Angeles, Wash., is perfecting plans for new local pulp mill in conjunction with saw mill. The first noted will have a capacity of about 150 tons per day, to be tripled at later date. The saw mill will be equipped for output of 1,000,000 ft. per month. Entire project will cost \$1,000,000 with machinery.

Spring Street Iron Works, Klamath Falls, Ore., is considering rebuilding portion of plant recently destroyed by fire with loss of \$70,000 with equipment.

Compton Union High School, Compton, Cal., plans construction of manual training shops at proposed new junior high school group in Haynes-Clearwater district, estimated to cost \$100,000. Frank M. Goodwin, Stockwell Building, Compton, is architect.

Dabney-Mills Alloys Corporation, Long Beach, Cal., has been formed to manufacture and sell diamond substitute and hard facing metals in the oil and other industries. Factory at 3454 Pine Avenue and sales office and warehouse at 3508 Atlantic Avenue are in operation. Company will be regular user of ferrotungsten, ferrochromium, ferrosilicon and nickel shot. F. R. Shumack is purchasing agent.

Canada

TORONTO, Ont., Sept. 3.—While most machine tool orders are for one or two tools each, buying in general is fairly extensive because of heavy replacement needs. Many small lists are appearing with the result that builders and distributors are looking for a brisk fall demand. The display of tools and machinery at the Canadian National Exhibition, being held in Toronto, is also a factor toward betterment in machine tool sales. The automotive industry and railways are buying regularly for replacement purposes, but orders for new plant equipment are somewhat limited.

Swansea, Ont., will build two sewage pumping stations on Queen Street, for which bids are being received by N. L.

Ivey, 107 Rennymede Road, Toronto. Equipment will be purchased.

Bids are being taken for a \$300,000 factory at Longueuil, Que., for Fairchild Aircraft, Ltd., 1253 McGill College Avenue, Montreal, Que. W. H. Wardell, 1463 Union Avenue, Montreal, is consulting engineer. The main building will be 140 x 260 feet.

Plans are being prepared by James Proctor & Redfern, Ltd., 36 Toronto Street, Toronto, for the erection of a one-story brick and steel factory addition to plant of Sieberling Rubber Co. of Canada, Ltd., at 99 Paton Road, Toronto. Cost is estimated at \$25,000.

The Hull Match Co., Montreal, has awarded general contract to A. F. Byers & Co., 1226 University Street, Montreal, for a factory on Montclair Boulevard, Perry & Luke, 1190 University Street, Montreal, are architects.

Dominion Bridge Co., Vancouver, B. C., has plans for construction of \$1,000,000 plant.

Hayes Wheel & Forgings of Canada, Ltd., Merriton, Ont., has awarded general contract to E. P. Muntz, Ltd., Temple Building, Toronto, for machine shop to cost \$100,000. H. G. Acres & Co., Ferry Street, Niagara Falls, Ont., are consulting engineers.

Foreign

IN connection with development of motor truck body manufacturing facilities, including extensions in Amo

works at Moscow, Soviet Russian Government, Moscow, is planning purchase of machine tools, bench tools, woodworking machinery and other mechanical equipment in United States, through Amtorg Trading Corporation, 261 Fifth Avenue, New York, official buying agency for Soviet Union. The Amo plant will be developed for a capacity of 25,000 2-ton trucks per year, while plants at Yaroslav and Spartak will be equipped for gross production of 1000 heavy truck units and 2500 light trucks a year respectively. Arrangements have been concluded with Hercules Motor Corporation, Canton, Ohio, manufacturer of gasoline motors of heavy type, for technical assistance in establishment of division at Yaroslav works for production of units of this kind.

Director of Aviation, Department of War, Santiago, Chile, is selecting site and will prepare plans for establishment of civil airport, including hangars, repair and reconditioning shops, oil storage and distributing buildings, and other field units. Entire project will cost \$500,000.

Following recent organization of Andrews Toledo, Ltd., Sheffield, England, to take over local plant and business of Jno. Hy. Andrews & Co., Ltd., manufacturer of drill and tool steels, steel rods, etc., new company is planning for complete modernization of works, including installation of additional equipment for increased output. Property will be transferred early in November. J. F. Parker is chairman of board of new organization.

New Trade Publications

Steel Strips for Cement Floors.—Lockstrip Mfg. Corporation, Long Island City, N. Y. Several new brochures on Lockstrip for cement floors to supplant scoring, form an expansion joint and flush finish surface, have been published.

Motor Control Equipment.—Electric Controller & Mfg. Co., Cleveland. A four-page pamphlet relates the advantages of using the company's motor starters and automatic compensators.

Large Vertical Motors.—Wagner Electric Corporation, St. Louis. A new bulletin, No. 159, has been issued, covering all types of large vertical motors, in ratings of from 1½ to 30 hp. As illustrated by diagrams in the bulletin, a feature of the motors is that they all have the same flange or lug dimensions, making it possible for manufacturers and users of small motor-driven machinery to interchange motors of different types and ratings on the same mounting dimension.

Switchboard Meters.—Sangamo Electric Co., Springfield, Ill. An addenda to bulletin No. 73 describes Sangamo type HN a.c. switchboard meters.

Boiler Feed Control.—Northern Equipment Co., Erie, Pa. Catalog of 16 pages, illustrating and describing the Copes system of boiler feed control, showing methods of attachment and some of the records taken from instrument charts. The actuating element is a thermostat.

Fire-Fighting Equipment.—American LaFrance & Foamite Corporation, Elmira, N. Y. A 176-page catalog, which contains complete listings and

descriptions of portable fire-fighting equipment, is virtually a text book on the subject of fire apparatus. The catalog is divided into eight sections and has a comprehensive index.

Electric Steel Castings.—Belle City Malleable Iron Co., Racine, Wis. A new 20-page, 6 x 9 booklet on the application and production of basic electric steel castings, besides showing and describing the facilities for the making of electric steel castings, gives many pointers on the effective use of steel castings, illustrated by actual examples. Details of the problems are given to facilitate the use of these ideas on other products and by other manufacturers.

Steel Castings.—Lebanon Steel Foundry, Lebanon, Pa. Bulletin No. 19 of two pages, entitled "Controlling Production," illustrated, is another of a series in the story of Lebanon electric furnace steel castings. It discusses the system used by this company in keeping track of and controlling the many varieties of castings which are constantly being produced.

Steel Castings.—Nugent Steel Casting Co., Chicago. Bulletin No. 119 of two pages, illustrated, is entitled "Improving an Age-Old Product." It discusses how the company makes the same metal into a better swivel than used to be produced and saves the manufacturer one operation.

Electric Heat in Industry.—Public Service Co. of Northern Illinois, Chicago. Brochure of photographs of installations of electric furnaces for steel melting, heat treating, baking various products and for cooking.